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WHAT IS THE FUTURE FOR SOF IN THE ARCTIC?

by

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December 2014

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This thesis will serve to answer the central question: "What is the future for Special Operations Forces in the Arctic?" The Arctic environment demands specially trained military personnel and units. Over time, the requirement for states to be able to operate in the Arctic is increasing while, for many, the capability to do so is decreasing. Future operations in the Arctic will depend on Joint, Interagency, Intergovernmental, and Multinational (JIIM) relationships. The operational environment of the Arctic currently lacks infrastructure, satellite and communication coverage, and strategic-through-tactical mobility.

The key recommendations from this thesis are:

- Current and/or future exercises should reflect Arctic-specific challenges.
- Networks, such as the Global Special Operations Forces (SOF) Network, should be empowered to address Arctic challenges.
- National SOF should participate regularly in Joint and International Arctic training exercises.
- Unit commands and mission planners should see analogies between current problems in other littoral regions of the world and the Arctic, and prepare accordingly.

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LIST OF ACRONYMS AND ABBREVIATIONS

A5	Arctic Five
AAR	air-to-air refueling
AA	additional activities
AJP	Allied Joint Publication (NATO)
ALCOM	Alaska Command (U.S.)
AKO	*Arktisk Kommando,* Arctic command (DNK)
AMC	Air Mission Commander
ANR	Alaskan NORAD Region
AOR	area of responsibility
ARCC	Aviation Rescue Coordination Center
ARF	Arctic Response Force
ARMSPECS	Arctic Rescue and Medical Specialists
ASC	Arctic Satellite Constellation
ASL	above sea level
ASFR	Arctic Security Forces Round Table
ATW	Air Transport Wing (DNK)
BP	British Petroleum
BS	Beaufort Sea
C2	Command and Control
C3	Command, Control, and Communication
CAFSAR	Canadian Armed Forces Search and Rescue
CA	core activities
CANR	Canadian NORAD Region
Canada COM	Canada Command
CAS	Close Air Support
CBA	capability-based assessment
CBRN	Chemical Biological Radiological and Nuclear Weapons
CCG	Canadian Coast Guard
CCSM	Community Climate System Model
CEAT	Camp Ethan Allen (U.S.)

CFB	Canadian Forces Base
CHOD	Chief of Defense
CJCSI	Chairman Joint Chiefs of Staff Instructions
CJOC	Joint Operations Command (Canada)
COE	Center of Excellence (NLD)
COCOM	Combatant Commands
COIN	counterinsurgency
CONR	Continental NORAD Region
COTRCIE	*Commandotroepen compagnieen,* Special Operations Forces Company (NLD)
CSAR	Combat Search and Rescue
COA	Course of Action
CP	counterproliferation
CRTC	Cold Regions Test Center (U.S.)
CT	counterterrorism
DA	direct action
DEW	Distant Early Warning
DIME	Diplomatic, Informational, Military, and Economical
DOTMLPFI	doctrine, organization, training, materiel, leadership and education, personnel, facilities, and interoperability
DOD	Department of Defense (U.S.)
DNK	Denmark
DSRV	Deep Submergence Rescue Vehicle
ECS	extended continental shelf
EEZ	Exclusive Economic Zone
EGI	embedded GPS and inertial navigation system
EU	European Union
EUCOM	European Command (U.S.)
FEMA	Federal Emergency Management Agency (U.S.)
FID	foreign internal defense
FKP	*Frømandskorpset* (DNK) [Maritime SOF]
GCC	Geographic Combatant Command

GSN	Global SOF Network
HA	humanitarian assistance
HBF	*Heeresbergführer,* Mountain Leader equivalent
HCGRP	hoist-cable guided refuel probe
HIFR	helicopter in-flight refueling
HRO	hostage rescue operation
HUMINT	human intelligence
HQ	headquarters
ICBM	Inter Continental Ballistic Missile
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISTAR	Intelligence, Surveillance, Target Acquisition, and Reconnaissance
ISA	International Seabed Authority
ISR	Intelligence, Surveillance, and Reconnaissance
JBER	Joint Base Elmendorf-Richardson (U.S.)
JPADS	Joint Precision Air-Drop System
JGK	*Jægerkorpset* (DNK) [Army SOF]
JIIM	Joint, Interagency, International, and Multinational
JP	Joint Publication (U.S.)
JTFN	Joint Task Force North (Canada)
JRCC	Joint Rescue Coordination Center
JSO	Special Operations Liaison element (NLD)
JTF-AK	Joint Task Force Alaska
KCT	*Korps commandotroepen* (NLD) [Army SOF]
LASAR	Long-range Arctic SAR
MA	military assistance
MARHELO	maritime helicopter
MDA	Maritime Domain Awareness
M&A	Mountain and Arctic
MCT	Maritime Counter Terrorism
METL	Mission Essential Task List
ML	Mountain Leader

MLTC	Mountain Leader Training Cadre
MRCC	Maritime Rescue Coordination Center
NATO	North Atlantic Treaty Organization
NLD	The Netherlands
NLMARSOF	Netherlands Maritime Special Operation Forces
NGO	non-governmental organization
NORAD	North American Aerospace Defense Command
NORDEFCO	Nordic Defense Cooperation
NORTHCOM	Northern Command (U.S.)
NRC	NATO-Russia Council
NSHQ	NATO Special Operations Headquarters
NSR	Northern Sea Route
NSW	Naval Special Warfare (U.S.)
NSWC	Naval Special Warfare Center (U.S.)
NSWG	Naval Special Warfare Group (U.S.)
NVG	night vision goggles
NWP	Northwest Passage
NWT	North West Territories
ODA	Operational Detachment Alpha (U.S.)
OGA	Other Government Agencies (U.S.)
OPV	Ocean Patrol Vessel
OPCON	Operational Control
PACOM	Pacific Command (U.S.)
PLF	Palestine Liberation Front
PGM	precision-guided munition
PMT	pre-mission training
PSSA	Particularly Sensitive Sea Area
PR	personnel recovery
PT	principle SOF tasks
RCC	Rescue Coordination Center
RCAF	Royal Canadian Air Force
RDAF	Royal Danish Air Force

RNLAF	Royal Netherlands Air Force
RNLMC	Royal Netherlands Marine Corps
SAO	Special Air Operations
SAR	search and rescue
SEAL	Sea, Air, and Land; Special Warfare Operators (U.S.) [Navy]
SFA	security force assistance
SFAMOS	Special Forces Advanced Mountain Operations School (U.S.)
SIC	sea ice content
SIGACTS	significant military activities
SOA	State Oceanic Administration
SOATG	Special Operations Air Task Group
SOCC	Special Operations Component Command
SOCEUR	Special Operations Command Europe (U.S.)
SOCNORTH	Special Operations Command North (U.S.)
SOCOM	Special Operations Command (U.S.)
SOCPAC	Special Operations Command Pacific (U.S.)
SOF	Special Operations Forces
SOLO	Special Operations Liaison Officer
SOLTG	Special Operations Land Task Group
SOMTG	Special Operations Maritime Task Group
SME	subject matter expert
SMO	Special Maritime Operations
SR	Special Reconnaissance
SR&S	Special Reconnaissance & Surveillance
TSOC	Theater Special Operations Command
TLZ	Tactical Landing Zone
TTP	Tactics, Techniques, and procedures
UCP	Unified Command Plan (U.S.)
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNCLCS	United Nation Commission for Limits of the Continental Shelf

USSOCOM	United States Special Operations Command
UW	unconventional warfare
WMD	weapons of mass destruction

EXECUTIVE SUMMARY

The undeniable geophysical changes taking place in the Arctic are bringing about the availability of what some argue to be the world's last remaining surpluses of undeveloped natural resources. This high concentration of scarce resources also happens to be located in one of the most ecologically sensitive environments of the world. The environment of the Arctic is fundamentally unlike any other region of the world, with a combination of sea, massive glacial masses, very little land, and sub-zero temperatures nearly year round. Nations-states are racing to lay claim to the resources with very specific yet independent strategies for environmental stewardship, economic development, and above all, their respective security. Similar to the evolution of other regions of the world, this situation will present challenges to governments and their military forces that might be charged with responding to such challenges in this region.

In order for nations to project elements of influence in this region, their militaries must be able to conduct and support operations along the full spectrum of conflict. The Arctic has been historically characterized as a non-militarized area, with matters of dispute being handled through diplomatic channels. As such, the Arctic has existed on the "peaceful" end of the spectrum of conflict. However, the current regimes and organizations designed to handle such matters are not adapting to the speed of physical change in the region. Furthermore, the geopolitical events taking place in other regions of the world will undoubtedly spill onto the canvas of politics in the Arctic. Very soon, the diplomatic channels for conflict resolution in the Arctic could be overcome by geophysical and geopolitical events, resulting in a politically sensitive and elementally harsh operating space. When states are left to their own means of projecting force into such a region, their Special Operations Forces will likely be the force of choice. Small groups of specially trained, mature, regional experts with years of international relationships will be the only components of state-funded elements of national power: Special Operations Forces (SOF) in the Arctic.

It is important to understand that the difficulties of operating in the Arctic apply to all who may operate in this region. As such, even when analyzing three international SOF

from states with varying levels of involvement in the Arctic, universal conclusions can be drawn about the assessed capabilities needed for this region. These universal conclusions are:

- The Arctic environment demands specially trained military personnel and units.
- Over time, the requirement for states to able to operate in the Arctic is increasing while the capability of many has been decreasing.
- Future operations in the Arctic will depend on Joint, Interagency, Intergovernmental, and Multinational (JIIM) relationships.
- The operational environment of the Arctic currently lacks infrastructure, satellite and communication coverage, and strategic mobility.

The key recommendations from this thesis are:

- Current and/or future exercises should reflect Arctic-specific challenges.
- Networks, such as the Global SOF Network, should be empowered to address Arctic challenges.
- National SOF should participate regularly in Joint and International Arctic training exercises.
- Unit commands and mission planners should transpose current problems of other littoral regions of the world onto the Arctic and prepare accordingly.

Because the Arctic is a unique region, challenges in this area will require equally unique solutions. The responsibility and environmental considerations for this region are too great for any one state to undertake. Sharing the responsibility of security for the Arctic not only improves the individual levels of preparedness, but also builds preparedness among international SOF communities.

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I. INTRODUCTION TO THE ARCTIC

A. A SPECIAL MISSION OPERATION IN THE ARCTIC

The night vision goggles (NVGs) dimmed as the Aurora Borealis gained intensity. The previous video noise in the NVGs was replaced by halo effects from the drizzle at the top of the stratus clouds. To the right, about 20 nautical miles (nm) out, a wall of nimbus stratus clouds rose up several thousand feet and appeared to reach down to the Arctic Ocean.

"I am glad we are not in that stuff," Jake said, "that would make Texaco more difficult." The pilots had engaged and fully relied on the autopilot, which was coupled to the embedded GPS and inertial navigation system, the EGI. The Outside Air Temperature gauge showed minus 4 degrees Celsius. The ice rate meter indicated light ice but increasing and approaching moderate. Nick, in the left seat, announced he was turning on the anti-icing on the helicopter. Anti-icing was required at least ten minutes prior to refueling in moderate ice conditions, and 20 minutes prior in heavy ice, to make sure the refuel probe would engage properly. According to the radar, they were 13 minutes out from the C-130 tanker orbiting at checkpoint Texaco. The anti-ice advisory lights came on, indicating all the circuits were functioning. Pete, the Special Operations Force (SOF) team leader in the back, complained about the cabin getting cold and asked that the heater be turned on. Jake responded, "Negative," as the heater was automatically turned off with the anti-ice system operating. The heater would deprive the engine of too much bleed air and the MH-60R would not be able to keep up with the C-130 tanker.

As briefed, Nick tuned to the appropriate frequency when passing phase line N66. "We'll soon be inside 'the Circle,'" Jake said. "I know," said Nick, as he checked his vest and dinghy. This was a habit that Nick caught himself doing. It was typically a routine when coasting out over water, but they had been flying over the ocean for five-and-a-half hours, jumping from Shell to Chevron, and now Texaco orbits, so it was most of all an indication of increased stress from flying over such a hazardous region for an extended period of time. Nick rationalized and told himself there was nothing to be concerned

about. The MH-60R had never let them down, he thought. It would not on this mission either.

Nick was Air Mission Commander for the rescue party, which was, in fact, part of the larger mission package. Just hours ago, the Norwegian assault party supported with other North Atlantic Treaty Organization (NATO) assets, had successfully executed an extremely complicated hostage rescue operation (HRO) and eliminated the "tangos." The mission had gone flawlessly, having been "rehearsed like a ballet," and the speed in execution caught the perpetrators by complete surprise. They probably thought the vast Arctic Ocean was a sufficient barricade against a rescue force, but it was not. Just a year ago, it would have been; however, six months back, nearly the same units trained on this contingency in a bi-annual Arctic SOF exercise. To add further irony, the cruise liner that was now captured, was the same ship used for training in a similar scenario six months ago.

The *Eurodam* was a ship from the Holland America Line, which on their "Norse Legends" cruise traveled up to see the polar ice cap. In the exercise, it was "stranded" 300 nm off the Norwegian coast, west of the city Harstad, about mid-way between the Island of Jan Mayen and the Norwegian mainland. The cruise liner in the exercise was held captured by a right-wing Norwegian citizen, threatening to "blow it up and sink it, drowning everyone on board." The problem for the rescue force in the exercise was that it was not, as in previous years, staging out of Evenes in Norway. Though the exercise was still hosted by the Norwegians, the scenario simulated a hostage rescue operation in the Arctic in late September. The weather off the west coast of Norway in March replicates Arctic conditions further toward the North Pole, well in current ice-free conditions. Therefore, the Danish Forces were staging out of Nuuk, Greenland, along with the U.S. contingency under the Danish Arctic Command, which was augmented by a multinational SOF cell, supporting the staff. The Dutch and Norwegian forces were staging out of the northernmost airbases in Denmark, Airbase Aalborg, home of the Danish Special Operations Command (SOCOM). This organizational setup—and its logistic footprint and significant mobility requirements—proved to be crucial in identifying the most important gaps in the Arctic SOF capability, range, response time,

and command and control, to include communication difficulties, interoperability, and knowledge about each other's capabilities.

Only a few operators and one aircrew were "new" since exercise Cold Response. This is not surprising when talking about the Danish or Dutch militaries because of their limited size, but even for the United States the recent leap in Arctic capability caused them to send crews with recent experience. It was a pack of superior trained personnel, a network of friends, with great trust and confidence in each other's skills. These skills and confidence were a direct result of the recent training, which otherwise would have resulted in crucial shortcomings hampering interoperability and ultimately mission success.

AMC Nick had been briefed directly by the SOCOM commander about the political drama, which luckily did not reach the tactical level, but had huge diplomatic implications for the national decision makers. Only by adhering to recent established binding agreements was it possible to gain traction in a situation with conflicting national interests and establish a response force. This political turmoil had unfolded in the strategic planning of the mission where it became obvious the Canadian forces were not able to partake in the mission. As a result of their opposition toward NATO's presence in the Arctic, Canada had not been part of previous or recent Arctic NATO training, and hence was not part of the recent Arctic Response Force (ARF) Agreement between the United States, Norway, and Denmark. As a non-Arctic nation, the Netherlands had agreed to provide tanker capability on an availability basis—something the United Kingdom, Germany, or France were not willing to do—as well as to provide SOF on an ad hoc basis, pending request and parliament approval. Pending request and parliament approval, Russia provided C2 support with its Arctic Satellite Constellation, ASC. All of this was made possible because of the recent ARF agreement. This was also why the Canadians stood out and why their C-130 and helicopters, the Cormorant—which is almost the same as the Danish EH-101, Merlin—did not have air-to-air refueling (AAR) capability, and why the Canadian helicopters were unable to refuel from the fuel bladders used on missions in the Arctic. The bladders were dropped by U.S. C-17s, using a Joint Precision Air-Drop System (JPADS) into an area "pit stop," which is a floating refueling

point in the vicinity of the target. This refueling ability turned out to be an essential capability; it enabled the helicopters to remain "on station," not having to climb up through the clouds in order to refuel, delaying the rescue effort. In essence, the fuel bladders were a modified version of the helicopter in-flight refueling (HIFR) used for years by the Navy in all of the participating countries—except that now the helicopter was not hovering next to a ship, and it was not dependent on Navy presence and response time. Instead, it hoisted down a rescue swimmer, who hooked up the hoist-cable-guided refuel probe (HCGRP) to the bladder valve. By using aircraft bleed air, the bladder was pressurized, enabling refueling and preventing potential contamination during a suction-type refueling. By using this type of refueling, the helicopters had **overcome the tyranny of distance** in the Arctic, and the helicopter **range now matched response time**. Now the only limitation was aircrew endurance.

After five-and-a-half hours over water, Nick, Jake, Pete, and their team in the back were strained, even though they had previously flown up to ten hours straight in the Afghan desert. Nick was not sure which he preferred, but he was sure this mission could not be any worse than the Afghan mission. The experience from the most recent training in exercise Cold Response had paid off and proven critical to Arctic SOF capability.

Jake elevated the radar to maximum range while the cruise ship was still beyond the acquisition range; however, the helicopters were on track. They had received precise coordinates—supposedly originating from Russian satellites—though in reality, the coordinates did not come from satellites; they were most likely reported from Russian unmanned submarines on surveillance missions in international waters in the Arctic. "That was not important," Lieutenant General Isberg, the Danish SOCOM commander had said; the important fact was that Russia was willing to cooperate and diplomatic relations had overcome the recent strained political efforts. Still, the coordinates had not been confirmed as reliable by the Rescue Coordination Center (RCC) staff at the Arctic command until two hours into the flight. The RCC had compared the grid to that of a previously reported position by the cruise liner—as part of the mandatory Arctic reporting system—prior to the hijacking.

Russia is not the only nation to use this kind of autonomous submergence vehicle. The United States has a classified program, originating from the Mystic (DSRV-1) Deep Submergence Rescue Vehicle. These unmanned submarines are officially used to monitor the oil drillings in the Arctic sea. This role was part of a multinational agreement between the United States, Canada, and Denmark. The goal was to avoid a disaster like the BP oil spill in the Mexican Gulf in 2010, or the Exxon Valdez incident in Alaska in 1989. The Exxon Valdez oil spill had shown what could happen in the Arctic, and environmental organizations and international pressure had forced the three governments to act and ensure this would not happen again. The DSRV was not just capable of monitoring oil spills; if disaster struck, the DSRV had an underwater incendiary device, which could weld the well shut in seconds, preventing oil or gas from escaping. Though the U.S. DSRV was too far away to partake in this particular mission, its capability and role was similar to that of the Russian submarine, and although the Russians claimed their sub was also used for humanitarian and environmental reasons, it was, in fact, performing the same task as the U.S. sub, monitoring shipping and illicit trafficking in the Arctic. The dependence on the DSRV was also why the Danish (Greenland) offshore rigs were placed farther north than what was optimum from an economic perspective. The Danish government had been under pressure when negotiating in parliament.

Environmental considerations required the rigs to be placed farther north than was economically preferable. This placement of the rigs was a consequence of the DSRV response time in case of an oil spill on a Danish rig. In the end, environmental concerns won. The position of these offshore rigs had consequences for the Danish search and rescue (SAR) capability, which now had to be able to reach farther north, in turn improving SOF air mobility as well. This extended range was going to prove its worth on this mission. Nick and his crew were very well aware of the "political clutter," as they called it. They also knew that it was time to prove this Arctic mission concept. Nick understood that whatever the outcome, this mission would have strategic implications going far beyond the rescue itself, and he was determined for the mission to succeed. "This mission will validate the ARF concept, the range of the Danish Long-range Arctic SAR (LASAR), and the ability to collaborate in a multinational setting on Arctic security

matters," Lieutenant General Isberg had said shortly before they stepped out to the aircraft. He added, "I know how this might affect you guys, but don't worry about that, let me sort out the weeds back here, and you guys go do what you do best; get the job done! You've done it all before, and I am confident you'll pull this one off as well," he said as he walked off.

Danish long-range SAR capability is unique compared to *conventional* SAR, yet it is similar to other nations' SOF air mobility. As a dedicated SAR resource, this asset extensively supports SOF. It is also in this SOF context—lessons learned from exercise Cold Response—the LASAR capability gained its current competence. The Danish LASAR is typically comprised of a C-130J (modified for helicopter AAR), 1–3 EH101 Merlin, and 1–3 MH-60R Seahawk (depending on mission type and conditions). The C-130 carries rescue operators from the Danish SOF, Frogmen Corps, along with Arctic Rescue and Medical specialists (ARMSPECS), a fuel tech, and a Tactical Landing Zone (TLZ) crew. This concept is based on the C-130 lead flying toward the scene of the incident. Once the helicopters are within fuel range—including 30 minutes for hoist operations—the C-130 rushes ahead in order to drop rescue rafts and possibly fuel bladders, and insert the Frogmen by parachute to expedite and coordinate the initial effort.

With three-plus-three helicopters on this mission, the LASAR element was at its largest. The C-130 was in the lead until reaching checkpoint Shell, where the helicopters refueled while the C-130 climbed up to refuel from a Dutch KDC-135 tanker also supporting the mission. From then on, Nick and his MH-60R were in the lead of the six helicopters as they flew north into the Arctic as part of the mission, which was not only the first Arctic SOF mission under the ARF, it was also recognized as the most complex multinational SOF mission ever. Because of recent training and exercise, equipment adaptation, and networking among partners—following binding security cooperation agreements between Arctic stakeholders—the mission was to be a success.

The previous scenario is fictional; however, it is rooted in the analysis of this study, and founded on "mission overlays" from actual historical events described later in this study, such as a Canadian SAR mission, the *Achille Lauro* HRO in the

Mediterranean, and Operation Eagle Claw. This short story highlights the key conclusions from the study and identifies how the issues—from strategic alliances to tactical considerations— can be overcome by proper preparation, thereby setting the path to success in future Arctic SOF missions.

B. THE NEAR FUTURE ARCTIC CHALLENGE

With the melting of polar ice, the Arctic is evolving into a region of significant strategic importance, particularly for the five Arctic littoral nations: Canada, Denmark, Norway, Russia, and the United States (Figure 1). While the High North has always been important to the "Arctic Five," the current geopolitical intricacies of the region present a number of challenges that may only be exacerbated as the ice continues to melt.[1] The considerable economic potential of the Arctic poses significant challenges for sovereignty, the environment, and security.[2] While the current Arctic security environment is characterized by cooperation, the potential for armed conflict is always a possibility.[3] Consequently, the national strategies of the Arctic Five, as well as other states with vested interest, speak to an increase in military capabilities and presence in the Arctic.[4] Amidst the transformation of the High North, this thesis will serve to answer the question: What is the future for SOF in the Arctic?

Around 2050, the Arctic Ocean is projected to be virtually ice-free in the summer, with only multi-year ice persisting between the islands of the Canadian Arctic Archipelago and in the narrow straits between Canada and Greenland.[5] These regional changes have disproportionate global economic and environmental implications. First,

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1 James Kraska, *Arctic Security in an Age of Climate Change* (New York: Cambridge University Press, 2011).

2 Kathryn Isted, "Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations," *Journal of Transnational Law and Policy* 18, no. 2 (Spring 2009): 350.

3 According to Peter J. Marzalik, "Analysts have long expected the Arctic to become a battleground for world powers." Peter J. Marzalik, "Canada Challenging Russian Claims in Arctic," August 21, 2014, http://www.eurasianet.org/node/69641.

4 U.S. Department of Defense, Joint Staff-MN/ACT, "Multinational Experiment 7: Outcome 1: Maritime Security Region: The Arctic," July 8, 2013, 16.

5 Eamer J. Donaldson et al., C.H. 2013, *Life Linked to Ice: A Guide to Sea-Ice-Associated Biodiversity in This Time of Rapid Change*, CAFF Assessment Series No. 10, Conservation of the Arctic Flora and Fauna, Iceland, 5.

with the pace of global warming, sea ice melt, and permafrost thaw, the Arctic and its abundant energy and natural oil and gas resources are more than ever exposed to development.[6] The Arctic holds an estimated 13 percent (90 billion barrels) of the world's undiscovered conventional oil resources,[7] and 30 percent of its undiscovered conventional natural gas resources.[8] Second, the Arctic's mineral reserves hold abundant deposits of iron, nickel, copper, coal, gold, uranium, tungsten, and diamonds. Until recently, many of these scarce mineral reserves were not exploited because of their inaccessibility and high development costs. Third, the Arctic can provide large quantities of fish (i.e., salmon and cod) for the fishing industry in the Arctic and sub-Arctic waters. These seas already suffer from illegal fishing and overfishing, and with the Arctic sea ice receding, and a limited presence of law enforcement agencies, this is likely to increase. Fourth, it is expected that with the melting of the ice, both Arctic shipping routes—the Northwest Passage (NWP) and the Northeast Passage, or Northern Sea Route (NSR)—will be used more and more by commercial shipping. This 'polar' route could become highly lucrative, as it is 40 percent shorter than the traditional route through the Suez Canal.[9] Finally, tourism is already expanding to the Arctic, resulting in an increasing of number of cruise ships throughout the region. It is expected that this number will continue to grow in the near future.

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6 James F. Collins et al., *A Euro-Atlantic Action Plan for Cooperation and Enhanced Arctic Security: Conference Report and Recommendations to the Arctic Council and Interested Parties* (Washington, DC: Carnegie Endowment for International Peace, February 11–12, 2013), 8.

7 Conventional oil is petroleum oil hydrocarbons, extracted and brought to the surface through the traditional oil well. In contrast, there is also unconventional oil. Examples are: oil shales, oil sands-based synthetic crudes and derivative products (heavy oil, Orimulsion), coal-based liquid supplies, biomass-based liquid supplies, gas to liquid (GTL)—liquids arising from chemical processing of gas. International Energy Agency's (IEA), *World Energy Outlook 2001*, http://www.worldenergyoutlook.org/media/weowebsite/2008-1994/weo2001.pdf.

8 Hobart King, "Oil and Natural Gas Resources of the Arctic," *Geology.com*, http://geology.com/articles/arctic-oil-and-gas/.

9 Sergey Smirnov, "Maritime Security and Arctic Issues: Challenges, Threats, and the Human Factor," in *From APEC 2011 to APEC 2012 American and Russian Perspectives on Asia-Pacific Security and Cooperation,* ed. Rouben Azizian and Antyom Lukin (Honolulu, HI: Asia-Pacific Center for Security Studies, 2012), 85.

Figure 1. Comprehensive view of the Arctic environment.[10]

The modern world has seen and overcome many challenges in recent times. While these challenges pose significant difficulties, they have played out in regions that for hundreds of years remained geophysically unchanged. The Arctic region will not look the same two decades from now. The sea ice is receding, coastal areas are eroding, and weather patterns are changing. Add the increasing geopolitical importance of the region because of the availability of natural recourses and the opening of new trade routes, and

[10] Stephen Rountree, *U.S. News and World Report*, http://www.usnews.com/articles/news/.

the world might be facing unprecedented security issues in a remote region with a unique and rapidly changing environment. As the Commander of the U.S. Special Operations Command Europe recently stated, "While Africa may be the challenge for this generation, the Arctic will be the challenge for the next."[11] This thesis touches on several interesting challenges for the military, in the future Arctic region.

The Arctic is not just a climate or temperature, but rather a region. This region is now changing in a way no other region in the world ever has changed before. Even more remarkable, most people today will live to see it! In order to envision the military challenges that follow from this rapid and unprecedented change, dynamic thinking is required. How does one operate in an area that is extremely restrictive to military operations, with a very limited sea, land and air accessibility, immense communication issues, and very limited local infrastructure? It takes more than just individual cold weather gear to operate successfully in this region.

Second, it is likely that there will be conflict in the Arctic region. Scarcity of natural resources and, therefore, the geostrategic importance of the region will make sure of that. Already, the lists of reported significant military activities (SIGACTS) in the Arctic over the last 12 months are extraordinary[12] and difficult to discount. Any potential military conflict is going to be extremely politically sensitive, complex, and may range from small-scale state on state scenarios to humanitarian assistance, supporting search and rescue, to fighting organized crime, terrorism, and piracy.

Third, from the U.S. perspective, the Arctic region is an intersection of several strategic U.S. military commands (NORTHCOM, EUCOM, and PACOM). Moreover, there is a shared responsibility of the region between U.S. Department of Homeland Security and U.S. Department of Defense. As a result, the responsibility for security and

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[11] Quote from Major General Brad Webb, Commander of U.S. Special Operations in Europe (SOCEUR) during the SOFIC in Tampa, FL, May 20, 2014.

[12] Russian SIGACTS in 2014 established the Northern Fleet Unified Strategic Command in 2014, and planning to establish an Arctic Command in 2017. Russia re-opened military bases on Wrangel Island, Nova Zembla, Kotelny Island, the Franz Josef Archipelago, and the Kola Peninsula. Russia conducted its biggest airdrop in the Arctic ever in March 2014, and held its biggest military exercise, "Vostok" 2014, since the end of the Soviet Union, with more than 100,000 troops participating in September 2014. Russia plans to build and re-open ten more naval bases in the Arctic region.

crisis intervention will be shared among different organizations and agencies. More important, the need for international partnerships to overcome capability gaps and "the tyranny of distance" is greater in this region than any coalition has seen in the past. As the potential for land grabs and resource availability increases, each state that is invested in the protection of the Arctic, can offer something to the overall projection of stewardship and security, soft or hard.

Fourth, in this fundamentally changing region, standard measures of capability and equipment functionality may be misleading. Currently, standard military equipment is not usually tested at environmental extremes typical of the Arctic. In order to prevent catastrophic failure of military equipment and risk to lives, joint exercises in field environments is the way in which to conclude with an extreme cold weather capability. Under current financial constraints on defense spending, replacing large stocks of military equipment is not feasible. However, if the responsibility of equipment and personnel aligned to the Arctic is distributed across multiple Arctic states under mutually agreed upon partnership, the costs would be offset to any one country involved.

The key conclusions of this thesis include:

- The Arctic environment demands specially trained military personnel and units.
- Over time, the requirement for states to able to operate in the Arctic is increasing while the capability is decreasing.
- Future operations in the Arctic will depend on Joint, Interagency, Intergovernmental, Multinational (JIIM) relationships.
- The operational environment of the Arctic currently lacks infrastructure, satellite and communication coverage, and strategic mobility.

The key recommendations of this thesis include:

- Current and/or future exercises should reflect the potential Arctic-specific challenges.
- Networks, such as the Global SOF Network (GSN), should be empowered for solving Arctic challenges.
- National SOF should participate regularly in joint and international Arctic training exercises.

- Unit commands and mission planners should transpose current problems of other littoral regions of the world onto the Arctic and prepare accordingly.

Because the Arctic is a unique region, challenges in this area will require equally unique solutions. The responsibility and environmental considerations for this region are too great for any one state to undertake. Sharing the responsibility of security for the Arctic not only improves the individual levels of preparedness, but also builds preparedness among international SOF communities.

1. Defining the Arctic

The Arctic region is an area of about 14.5 million km^2, one sixth of the Earth's surface.[13] The word "Arctic" is a derivation of the Greek word ἀρκτικός (*arktikos*), "near the Bear," which connotes that area lying under the "Big Dipper." Astronomically, it is the whole area lying north of 66°33'N (the Arctic Circle).[14] As shown in Figure 2, there are a wide variety of definitions used by different organizations to define the Arctic region. Some include the tree line, others the isotherm (average temperature below 10°C) in July, or even the Aurora Borealis.[15] Any boundary in this region will change with its application: environmental, biological, economic, jurisdictional, or social. For example, the Arctic Council working groups have different definitions that reflect each of their interests.[16] This thesis will refer to the Arctic being the territory inside (North) of the Arctic Circle. Although this definition is debatable, it will serve the purpose of discussing the general political, economic, cultural, and military issues.

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[13] "Polar Discovery," Woods Hole Oceanographic Institution, 2006, http://polardiscovery.whoi.edu/arctic/geography.html.

[14] North Atlantic Treaty Organization [NATO], *Naval Arctic Manual (ATP 17(D)),* NATO Standardization Agency (Brussels, Belgium: SHAPE, April 2014), 1-1.

[15] Also known as the northern lights, named after the Roman goddess of dawn, Aurora, and the Greek name for the north wind, Boreas.

[16] G.R.I.D. Arendal, "Boundaries of the Arctic Council Working Groups," October 9, 2013, http://www.grida.no/graphicslib/detail/boundaries-of-the-arctic-council-working-groups_8385#.

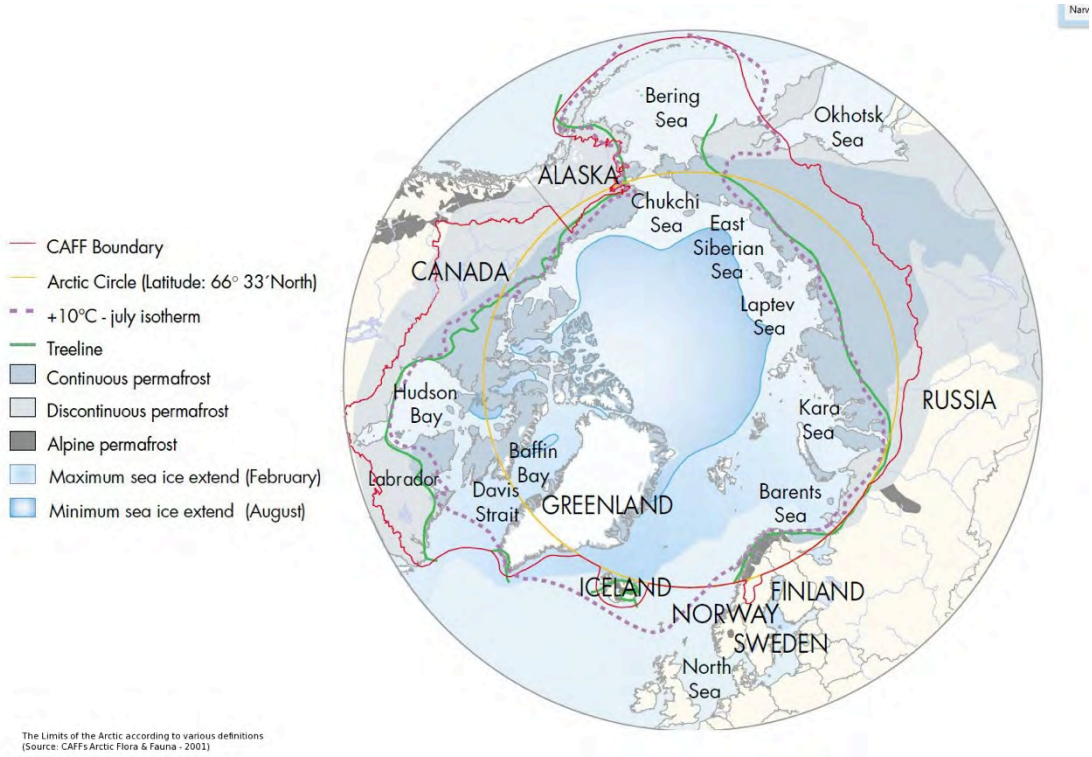

Figure 2. Different boundaries in the Arctic region.[17]

2. Historical Context

The recent history of the Arctic could reveal what the future holds. Despite severe climatic conditions, the region has always attracted people.[18] Its first inhabitants date back some 20,000 years.[19] The Arctic region continued to be developed by humans in Greenland and the northern parts of the Canadian Arctic Archipelago. These areas were inhabited the latest of all. In the American Arctic, the population mostly migrated from west to east, in Eurasia—mainly from south to north. As a result, one thousand years ago the Arctic territory of the North was fully settled in by the ancestors of the indigenous peoples who live in this region to this day.

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17 Arctic Council, Conservation of Arctic Flora and Fauna (CAFF) Working Group, CAFF map no. 46, "The Limits to the Arctic according to Various Definitions," 2001, http://library.arcticportal.org/1378/.

18 Arctic-info: Encyclopedia, "The History of the Arctic," http://www.arctic-info.com/Encyclopedia/Rubric/The%20History%20of%20the%20Arctic.

19 "Polar Discovery," Woods Hole Oceanographic Institution.

Colonization and exploration by the Northern European states started in the fifteenth and sixteenth century, searching for resources and a Northern sea route to the Far East. Settlements of Europeans, which were few in number and were mostly strategic forts and trading points, began to appear in the Arctic region. The colonization process was the same throughout the Arctic region. At first, the indigenous peoples maintained their autonomy. Gradually, the native population was displaced or put in reservations to serve as a transition from primitive to "civilized." Because of these policies, indigenous peoples in the whole Arctic region were forced from their traditional lands and had to constantly deal with many social problems, especially poverty and disease.[20]

From a military historical perspective, the Arctic region has been a theatre of operations several times before in recent military history. During the Nazi-German Operation Zitronella in the Second World War, German and Allied troops fought over control of Spitsbergen. This marks the highest latitude at which a land battle has ever been fought.[21] Also in the Second World War, the United States and Canada fought the Japanese in the Aleutian Islands Campaign in the Alaska Territory. Elsewhere, Nazi-German Operations Rösselsprung and Wunderland were Arctic naval battles in the Second World War. These operations showed the difficulty of surviving, let alone fighting in the Arctic region.

During the Cold War, the Arctic Region became known for its geostrategic importance and home of most of the "second strike" assets of both the NATO and Warsaw Pact. This brief history of the Arctic shows that military presence in the Arctic is not new. After the cold war, security policy was refocused and the Arctic was out of sight; however, recent climate change is pulling the Arctic back to center stage, and changing the geopolitical character beyond anything seen before.

C. PURPOSE AND SCOPE

The purpose of this thesis is to examine the future role and mission of SOF in the Arctic. Furthermore, it examines what the capability requirements for SOF might be. As

[20] Arctic-info: Encyclopedia, "The History of the Arctic."

[21] John Keegan, *A History of Warfare* (London: Random House, 1993).

mentioned previously, there is an absence of current military literature regarding the SOF in the Arctic. While this may be partly due to security classifications, it also speaks to a possible lack of foresight for the role of SOF in the High North. Despite the likelihood that boundary disputes will be solved via peaceful means in accordance with international law, there are numerous hypothetical vignettes that could require a SOF response in the Arctic.[22] While it may be tempting to simply overlay current SOF capabilities onto the Arctic environment, the inherent complexities of operating in the High North preclude such a convenient approach.

The scope of the research is focused on Denmark, the Netherlands, and the United States. These countries offer a perspective that is characteristic of the expected future interests in the High North; varying in size and across the spectrum of Arctic involvement, interests, and capabilities. While Denmark and the United States are part of the Arctic Five (A5), with sovereign territory in the High North, the Netherlands is a non-Arctic state with observer status on the Arctic Council. For all three countries, any military activity in the Arctic will involve a complex balance of national policy, international law, diplomacy, and capabilities. Although the scope is limited to the three nations, the overall analysis and recommendations will be of value to all states with a vested interest in the Arctic.

D. TARGET AUDIENCE

The target audience is primarily the national SOF commands and the respective SOF unit leadership. The secondary audiences are planners and directors of exercises with an Arctic scope. These exercises could benefit from the vignettes developed in this thesis. In order to accommodate readers with varying interests, elements of the study are put in appendices, thereby shortening the study for all readers, while allowing elaboration on lengthy but essential elements of the study on subjects of particular relevance to some, but not for others. This does not distort or weaken the study, rather it creates a better foundation for the answering the research question.

[22] The vignettes discussed in Chapter IV of the thesis are: (1) Counter Proliferation (CP); (2) Hostage Rescue Operation (HRO); (3) Maritime Counter Terrorism (MCT); (4) Search and Rescue (SAR); (5) Strategic Reconnaissance (SR); (6) Arctic Security Forces Assistance (SFA).

E. THE PROBLEM

There are different ways of framing the problem for SOF in the Arctic. First, although a considerable amount is written on Arctic security issues due to the changing environment, not much is written on the consequences for SOF. For example, SOF is not mentioned at all by the A5 in any of the military strategies or governing documents concerning the Arctic; therefore, there is a lack of guidance.[23] Speaking with different national SOF commands, including the United States, the Arctic is on the agenda but does not yet have the priority it deserves. The lack of manpower within the different SOF and Combatant Commands (COCOM), as well as the current operational tempo, could well be the main factors for this neglect.

Second, there seems to be a lack of interest in the Arctic in general that has left states unprepared.[24] Since the collapse of the Warsaw Pact, but even more so since the start of the Global War on Terror, the Arctic has become a secondary or even tertiary theatre. Understandably, this has resulted in a general neglect of the region.

Third, and most likely as a result of the second point here, there seems to be no thought on possible future scenarios requiring military/SOF response in the Arctic. There seems to be a lack of comprehensive research for SOF operations in the Arctic, which results in the absence of clear and plausible scenarios and vignettes that could be used for exercise and training. A clear example that underlines this point is the absence of plausible SOF scenarios used for the two biggest exercises in the Arctic: the bi-annual exercises Cold Response and Tundra[25] in Norway, and operation Nanook[26] in Canada. In

23 Colonel de Jong, in interview with authors, May 15, 2014.

24 This is a general theme from the interviews between authors and the various SOF commands and representatives.

25 Exercises Cold Response and Tundra alternate each year, where the former is the larger exercise with predominantly conventional forces participating; the latter is more focused on SOF. Norwegian Armed Forces, "Cold Response 2014," http://mil.no/excercises/coldresponse/Pages/default.aspx.

contrast, these exercises still use "classic" conventional/SOF scenarios to train participating troops.

F. RESEARCH QUESTION

This thesis will serve to answer the central question: "What is the future for SOF in the Arctic?" Additional questions that logically follow from this central question include:

- What could be the future role and missions for SOF in the Arctic?
- Is there a lack of strategic guidance for the future role of SOF in the Arctic?
- Is SOF (in general) prepared to conduct (likely) missions in the Arctic?

In combination with the depicted hypothetical vignettes, research of the current capabilities will determine the level of preparedness and current capabilities to conduct SOF operations in the Arctic for Denmark, the Netherlands, and the United States. This will lead to obvious conclusions and recommendations for SOF. The recommendations made could serve as a guide to force development initiatives.

G. RESEARCH DESIGN

This thesis first explains quantitative analysis of meteorological data that will provide insight into the unique and relevant future geophysical environment. Next, an analysis will be conducted on the geopolitical environment in the Arctic, with an emphasis on regional security implications. This is followed by an analysis of each of the countries' SOF, using DOTMLPFI.[27] An analysis of the strategic ramifications using the

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[26] Operation Nanook is the foremost recurring sovereignty operation conducted by Canadian Forces (CF) in Canada's Arctic, held annually since 2007. It is a whole-of-government operation highlighting combined, joint and integrated military maneuvers. Conducted with personnel, vessels, and aircraft from the Army, Navy, Air and Special Forces, NANOOK is planned and directed under the authority of Joint Task Force North (JTFN), the regional command responsible for the conduct of all routine and contingency operations in Canada's North. Headquartered in Yellowknife, NT. JTFN is one of six regional commands reporting to Canada Command in Ottawa, http://gordonfoundation.ca/sites/default/files/images/Operation%20NANOOK.pdf, http://www.community.gov.yk.ca/emo/op_nanook.html.

[27] DOTMLPFI stands for doctrine, organization, training, materiel, leadership, personnel, facilities, and interoperability. The DOTMLPFI method of analysis is a NATO-recognized method for measuring military capability and is explained in detail in Chapter III.

principles of DIME (diplomacy, information, military, and economics) will yield similar trends in security situations that will be used to construct scenarios/vignettes involving SOF in the Arctic.

To reinforce the conclusions and recommendations, a scenario-based planning approach is chosen.[28] A distinction has emerged between scenarios and vignettes, and it is important to differentiate between scenarios at the tactical and strategic levels. Scenarios are typically viewed as official higher-level storylines at the strategic level, serving as contingencies for defense planning. Vignettes on the other hand, are hypothetical tactical situations that are not officially approved, yet are nested within a higher-level scenario.[29] This thesis uses vignettes—derived from the geophysical and geopolitical analysis—with the understanding that the methodology is consistent with the literature on scenario based planning. Figure 3 shows the relationship between scenarios and vignettes.

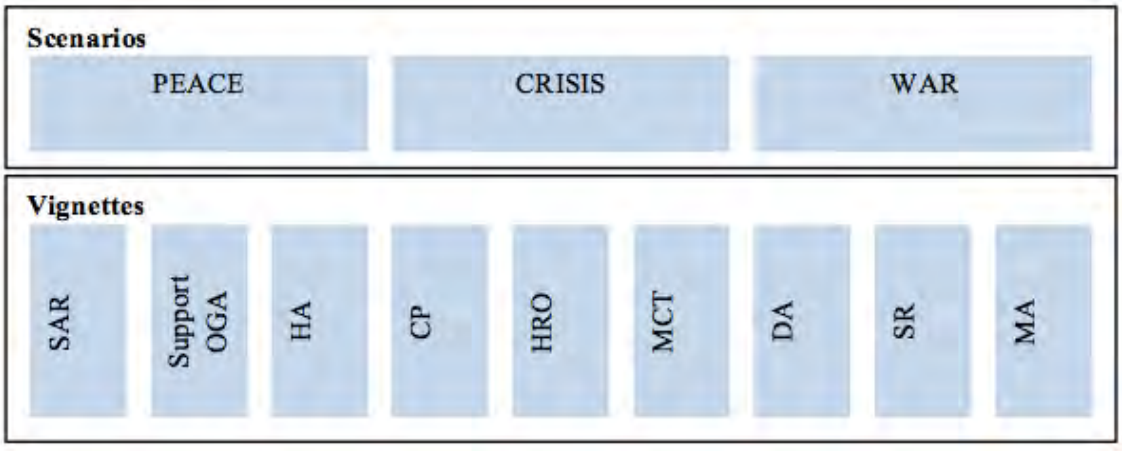

Figure 3. SOF scenarios in relation to vignettes.

[28] Typically, force planning employs one or more of eight different approaches. The eight alternative approaches to force planning reviewed by Barlett, Holman, and Somes (2002) are: top-down; bottom-up; scenario; threats and vulnerabilities; core competencies; capabilities and missions; hedging; technology; and fiscal. While none of the approaches is deemed superior in concept, scenario-based planning is particularly well suited to a problem with a large number of variables and uncertainties. Scenario planning enables a simplified method to examine a complex problem by limiting the scope to a specific set of variables. Paul J.H. Schoemaker, "Scenario Planning: A Tool for Strategic Thinking," *Sloan Management Review* 36, no. 2 (1995): 25–40.

[29] Thierry Gongora, *Scoping Missions and Tasks for CANSOFCOM in the Canadian North* (Canada: Defence R&D Canada, Centre for Operational Research and Analysis, 2012), 29.

The objectives of this thesis are threefold. First, the thesis provides vignettes that can be utilized by military and exercise planning staffs to improve the current (bi-)annual Arctic exercises involving SOF. The vignettes can also be used as a starting point for a detailed mission analysis, by other nations or (SOF) units not represented in this thesis team and with a vested interest in the Arctic. Second, in combination with the vignettes, the analysis conducted in this thesis can be utilized in war gaming by SOF commands concerned with the Arctic region. Third, the analysis followed by the conclusion and recommendations offers a unique insight into the potential shortfalls in the current Arctic capabilities of SOF in general.

1. Methods

The primary collection method will be the document analysis, augmented by the interviews with SOF units, and selected SOCOM and Theater Special Operations Command (TSOC) personnel. Together, this will provide an in-depth analysis of the Arctic spanning from a political-strategic perspective through the operational level and down to a more pragmatic tactical perspective. This will not only enhance the understanding of the entire Arctic (security) environment by identifying tactical constraints with possible strategic impact,[30] but it will also serve as a catalyst in understanding the Arctic security issues, thereby establishing a recognized ownership of the "Arctic mission" at the SOCOM and SOF unit level of the involved nations.

a. Governing Document Analysis

A variety of documents ranging from international treaties, national and military strategies, official doctrine, and academic studies will be analyzed to investigate the strategic climate in the Arctic. The governing documents can be divided into three levels of analysis, ranging from international, to national, and to unit level. These documents will serve to illustrate the challenges that exist on an international policy level. Arctic and national strategies, and other governing documents of both A5 members and non-Arctic

[30] Though this study does not conduct a gap analysis as such, NATO's *Joint Analysis Handbook: 3rd Edition* has been used to gain sufficient knowledge on how to access capability efficiency in relation to a proposed vignette. For further reading on this, see NATO, *Joint Analysis Handbook: 3rd Edition* (Brussels, Belgium: NATO, October 2007).

states, will serve two purposes in this study. First, they will provide a clear indication of national involvement and ambition in the Arctic. Second, they will provide a political mandate to national Arctic military institutions. At the unit level, established policies and doctrine provide insight towards military roles and ambitions, and to what degree it prioritizes fulfillment of its Arctic responsibilities.

b. Interviews

The interviewees are selected Danish, Dutch, and U.S. SOF unit commanders, and SOCOM personnel. The aim of these interviews is threefold: (1) to gather information on the current level of preparedness and capabilities for Arctic contingencies within the three nations mentioned; (2) to receive input for the vignettes and make these as realistic and acceptable as possible; and (3) to reflect on the research done up to that point, by the team.

2. Resources

The resources consulted in this research related to the force development framework are summarized by category in Figure 4. Similarly, the sources cited in the literature review are shown by category in Figure 5.

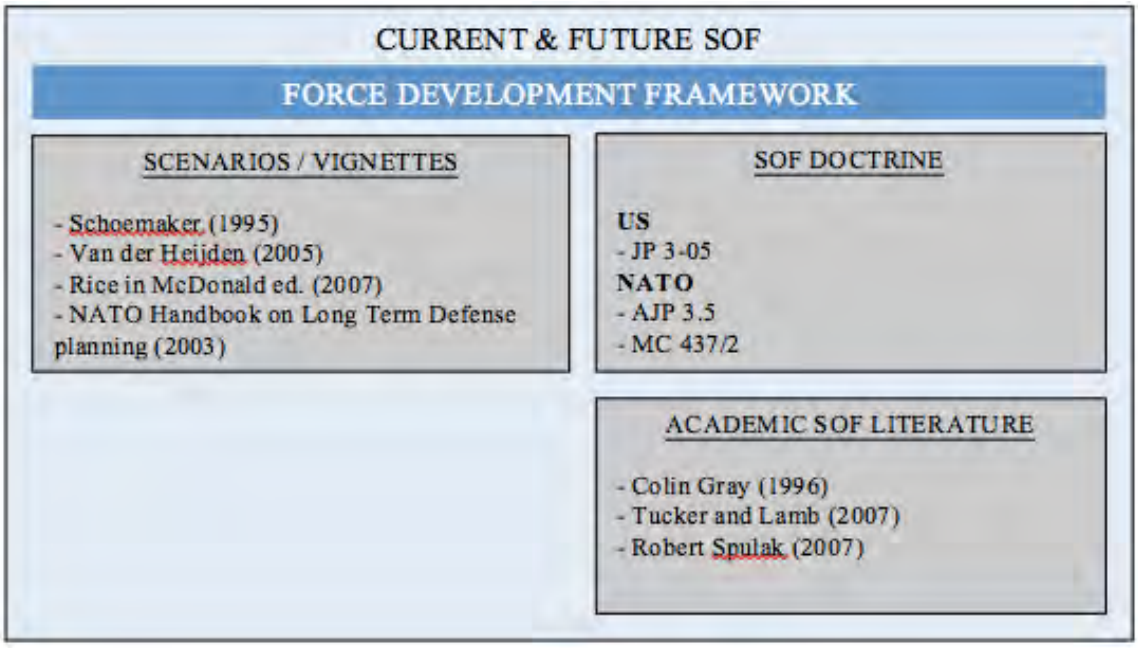

Figure 4. Force development framework.

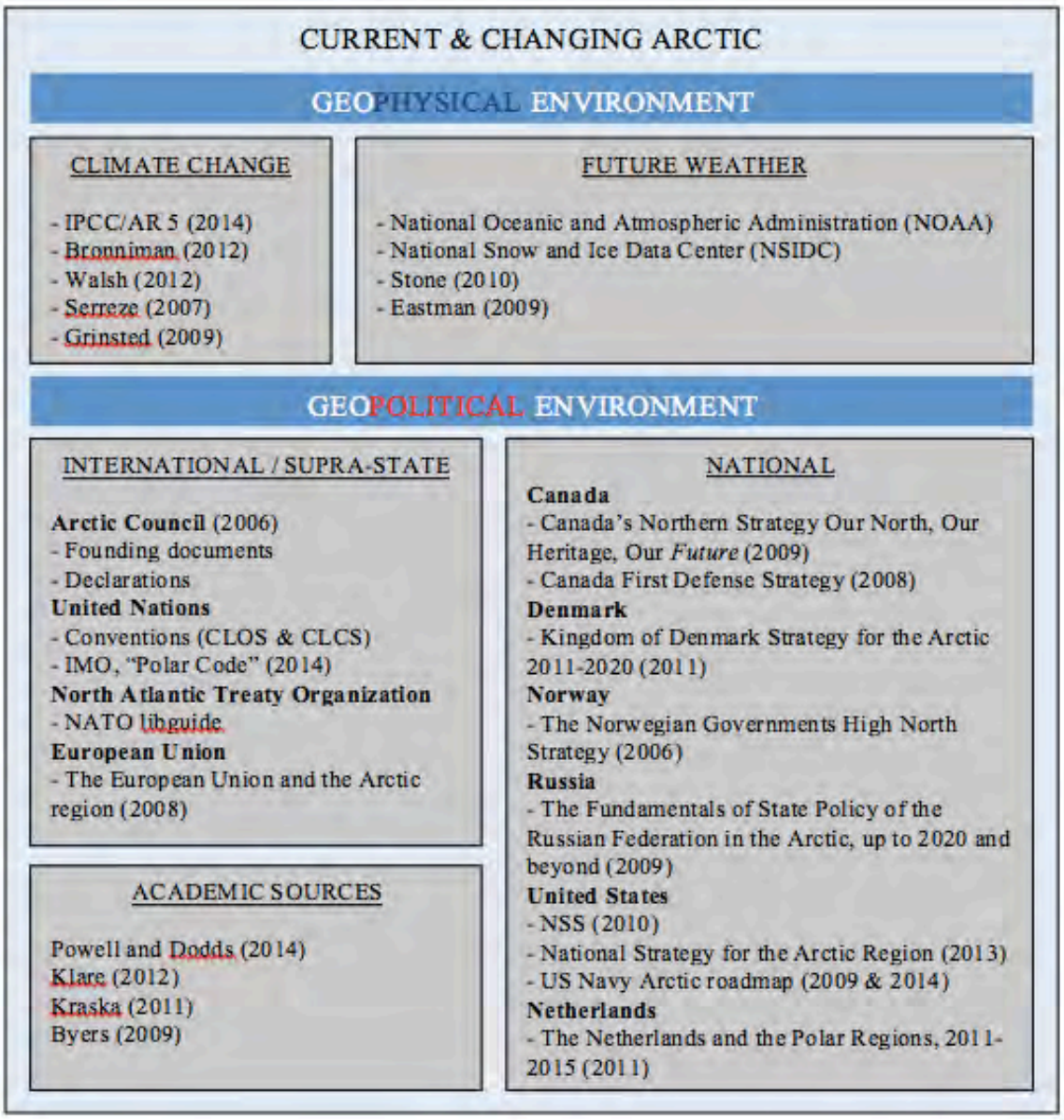

Figure 5. Literature overview.

II. THE CURRENT GEOPHYSICAL AND GEOPOLITICAL ARCTIC ENVIRONMENT

This chapter describes the current geophysical and geopolitical situation in the Arctic region, and provides a comprehensive overview of why and how things are changing in the region. Together with the description of the current Arctic military (SOF) capabilities in Chapter III, this will logically result in the strategic ramifications described in Chapter IV.

The first section is devoted to the geophysical change, and focuses on two main issues: (1) the Arctic environment is undergoing an unprecedented change; the sea ice is melting and transforming the Arctic region; and (2) the weather in the Arctic is affected by the changing climate, which is often overlooked. The Arctic weather is unique, unpredictable, and hazardous. These characteristics will likely increase as the Arctic sea ice melts. The degree of success for any operation in the Arctic will demand special attention and equipment to overcome the unforgiving and rapid-changing environment.

The second section of the chapter describes how the availability of resources and opportunity afforded by the rapid geophysical changes has resulted in the promulgation of specific Arctic strategies, and not only from the Arctic States. It furthermore describes the current level of governance and how this is changing because of the increasing amount of stakeholders. This chapter closes with the current disputes and claims in the Arctic region.

A. GEOPHYSICAL CHANGE

This section lays out the future trend for the Arctic climate, and elaborates on certain meteorological conditions and metrics emphasizing the importance of preparing to operate in the Arctic environment.

1. Climate Change

As mentioned in Chapter I, the Arctic has received increased and significant political attention the last few years. The reason for this unprecedented devotion is the likelihood that climate change will rapidly expose abundant natural resources.

Military planners need reliable information about the weather. The historical analogies in Chapter V show how insufficient knowledge about the weather influenced mission outcome and that weather can mean the difference between mission launch, cancellation, or delay, and ultimately the difference between failure and success. The current research focuses exclusively on climate change, and does not answer the question: "What will the future weather be like in the Arctic?" This analysis on Arctic climate change is a meta-study providing insight to that question. A more complete analysis is found in Appendix A; however, this section highlights the most important elements.

The future trend is clear. Although predictions of an ice-free Arctic range from the years 2037–2100, it seems evident that the ice will continue to melt. The latest Intergovernmental Panel on Climate Change (IPCC) report predicts an Arctic Ocean where the ice has nearly disappeared by 2050. Considering this is the most recent and elaborate report, and the fact that it also represents an approximate mean value of the various prognoses, 2050 will be the adopted prediction for this study.

2. Future Arctic Weather

The weather in the Arctic sets forth special requirements towards tactical mobility in the Arctic region. Clouds will inevitably make it difficult for aviation operations due to low ceilings with poor visibility. Furthermore, there is a likely risk of encountering ice in the clouds if trying to mitigate adverse weather by attempting to climb above the lower cloud layers,[31] which in itself could be difficult or impossible to accomplish due to Nimbus Stratus clouds and equipment limitations (see Figure 6).

[31] This is a common contingency if encountering weather conditions unsuitable for flight under Visual Meteorological Conditions in aviation mission planning. See Headquarters of the Department of the Army, *Army Regulation 95-1 (AR 95-1)* (Washington, DC: Department of the Army, 2014), 39, paragraphs 5–6.

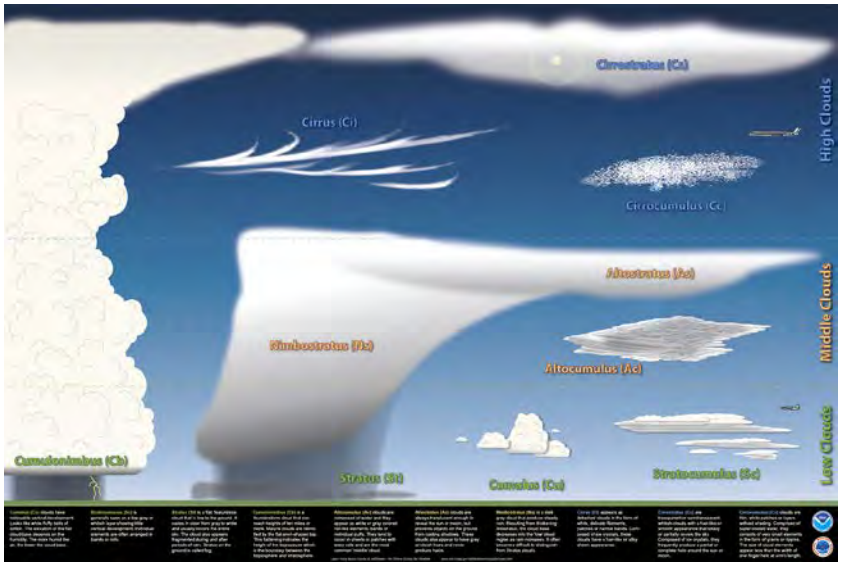

Figure 6. Cloud classification.[32]

Although Arctic weather complicates aviation operations, commercial air traffic is pushed to the Arctic for the same reasons behind current geopolitical changes in the Arctic: economic incentive. It is the shortest route across the Atlantic connecting the East and West. From a civilian aviation perspective, the Arctic is considered a hostile environment.[33] There are specific regulations and manuals pertaining to North Atlantic operations such as the *North Atlantic International General Aviation Operations Manual*.[34] Although the military does not always follow the same safety requirements as its civilian counterparts, specific training, planning, rehearsal, and equipment is paramount in order to prepare for the adverse Arctic environment. This is particularly important if attempting to successfully conduct missions operating in, and not just above, the Arctic.

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[32] NOOA, "National Weather Service: Jetstream – Online School for Weather," http://www.srh.noaa.gov/jetstream/clouds/images/cloudposter.jpg.

[33] JAA, "JAR-OPS 4 Subpart F, section 1," http://www.jaa.nl/secured/Operations/Helicopters%20Archives/03HSC_Documents/Jan-Feb02/Comparison%20between%20HELO%20HAGO%20and%20HSO%20(HSC%20Orlando).pdf.

[34] FAA, *North Atlantic International General Aviation Operations Manual,* Federal Aviation Administration, 2004, http://www.faa.gov/air_traffic/publications/media/NAT%20IGA%202004.pdf.

NATO ATP-17(D) *Naval Arctic Manual* was published during the time of writing this study. ATP-17(D) supports the findings in this study concerning the weather in the Arctic.

> The general character of cloud cover over the Arctic differs considerably from that considered typical foremost [sic] temperate regions. … The uniform and contourless stratus clouds … give to the Arctic its reputation of a dull and monotonous appearance ... the low stratus-type cloud constitutes from 70–80 percent of all clouds observed.[35]

Not only does ATP-17(D) validate this chapter, it also elaborates on some of the other meteorological metrics beyond this study and shows the importance of preparing to operate in the Arctic environment. ATP-17(D) also states how melting "in some cases, completely inhibits summer ground mobility. … Less than five percent of the Arctic lands are covered with permanent ice."[36] The ATP-17(D) adds:

> The Arctic littoral has distinctive processes at break-up or freeze of ice…. On coasts where the tidal range is considerable, boulder barricades are the most conspicuous sign of the action of sea ice. Typically, there is a narrow string of boulders parallel to the shore and several hundred feet out. They represent navigational danger on the approach to many open beaches ... Thermal erosion may also produce glacier-like mud streams.37

These conditions may inhibit conventional littoral operations. ATP-17 also states that, "precipitation over most of the Arctic is very light and the annual amounts are so small that the region is classified as a desert based on annual precipitation."[38] Lack of precipitation is not the only commonality between Arctic and desert environments; ATP-17 notes, "the lack of contrast, particularly where all surface objects are covered with new snow, results in the inability to distinguish objects close at hand."[39] This seems relevant to all mobility assets whether air, ground or naval. These white-out conditions are augmented by the uniformity[40] of the Arctic; the lack of trees and other significant

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35 North Atlantic Treaty Organization [NATO], *Naval Arctic Manual (ATP 17(D)),* 2–10.

36 Ibid., 1–5.

37 Ibid., 1–8.

38 Ibid., 2–10.

39 Ibid., 2–9.

40 North Atlantic Treaty Organization [NATO] *Naval Arctic Manual (ATP 17(D)),* 1–5, 2–9.

vegetation,[41] reducing visual cues, in turn hampering the ability to operate based on visual references in the same manner as in temperate regions. This condition is referred to as "Arctic white-out."[42] In the summer months, at which time the Arctic is most accessible, precipitation may fall as freezing rain or freezing drizzle. While this may inhibit airmobile operations, this is reported as less than ten hours per year.[43] Therefore, the primary concern for mobility seems to be the low clouds, with possibly associated icing, and poor visibility in fog along with periods where ground mobility is impossible on the tundra.

Not only is the Arctic a unique and hazardous ice desert, the Arctic is primarily a maritime environment. "The single feature that makes the Arctic Ocean markedly different from most of the world's oceans is the presence of a perennial sea ice."[44] The sea ice imposes restrictions on ships operating in the Arctic. This will affect what type of ships can be used for staging or basing of SOF or as mobility assets. "In the Arctic, there are no generalizations that can be made about the occurrence of sea ice in relation to latitude … one of the most important forecasting problems is ice motion."[45] This is not only important for ships in the Arctic, remembering the correlations between sea ice, and cloud cover (see Appendix A), the uncertainty of sea ice conditions will affect forecasting of Arctic weather, in turn affecting ground, air, as well as naval forces, illustrating the uncertainty and hostility associated with operating in an Arctic environment.

a. Conclusions and Recommendations

As described in Appendix A, the single regression between annual total cloud covers and sea ice content (SIC) seasonal cycles, provides insights toward the weather in a future Arctic environment. This may shed light on some of the uncertainty in forecasting Arctic weather. As shown, the change in SIC explains 78 percent of the change in total cloud cover in the Arctic. Although there is more to the weather in the

41 Ibid., 1–2.

42 Ibid., 2–10.

43 Ibid., 2–11.

44 Ibid., 4–1.

45 Ibid., 4–5.

Arctic than just cloud cover and visibility—as NATO ATP 17(D) outlines—it is a good indicator for other meteorological metrics. In order to avoid disaster in future Arctic military operations, planners, aviators, and other mobility assets operating in a future Arctic environment should be aware of the specifics of the unique, hostile, and changing Arctic weather patterns. In short, ground mobility is likely inhibited in spring and summer months. Low clouds with reduced visibility and Arctic white-out conditions, as well as icing, impose restrictions on air mobility. The unpredictability of sea ice forecasting influences the maritime environment in which naval forces can operate in the Arctic; however, detailed knowledge of the weather and regional specifics can mean the difference between mission success and failure. Therefore, the forces going to operate in the Arctic region must prepare accordingly whether it be ground, air, or naval forces.

B. ARCTIC GOVERNANCE, TREATIES, AND POLICIES

Several treaty-based organizations and policies have been created to govern the land, sea, and other activities in the Arctic. Each is comprised of state-based, non-state, and nation-state organizations' interests in the region. From organizations to oversee the environmental aspects of the region, narrowing down to the maritime and seabed boundaries, this section will describe the most prominent organizations that govern matters pertaining to operations in the Arctic.

1. The Arctic Council

There are several organizations interested in the Arctic, including international, non-governmental, and domestic entities. The principle and most influential organization on geopolitical matters is the Arctic Council.[46] The Arctic Council, created in 1996, consists of the eight Arctic States (Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States). The Arctic Council was created as a forum to oversee and coordinate the Arctic States' activities and involvement in the

46 Tim Williams, "The Arctic: Organizations Involved in Circumpolar Cooperation," Publication No. 2008-15-E, Industry, Infrastructure and Resource Division, Parliamentary Information and Research Service, 2012, http://www.parl.gc.ca/Content/LOP/ResearchPublications/2008-15-e.pdf.

Arctic, centered on preservation of the environment.[47] Membership in the Arctic Council is governed by the Declaration on Establishment of the Arctic Council (The Ottawa Declaration), and can be approved only by the Arctic States.[48] The Declaration recognizes the Inuit Circumpolar Conference, the Saami Council, and the Association of Indigenous Minorities of the North, Siberia, and the Far East of the Russian Federation as Permanent Participants in the Arctic Council.[49] Actions within the Arctic Council are outlined in the "Arctic Council Rules of Procedure" (2013), and are ultimately decided on only by the consensus of the Arctic States.[50] The most recent document to be signed by the Arctic Council is the Kiruna Declaration (2013), in which climate change contributors and concerns over the outcome of economic endeavors are recognized.[51] Of note, the Arctic Council forum does not discuss matters of security and, according to its charter, militarization of the Arctic is an undesirable course of action.[52] However, the Arctic Council collaborates with the UN Convention on the Law of the Sea (UNCLOS) and the International Maritime Organization (IMO), both of which have jurisdiction over matters of maritime security and sovereignty rights in the Arctic.[53]

The rapidly changing Arctic environment has generated a long list of regimes, institutions, and organizations—all stakeholders—to deal with Arctic issues.[54] Although

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47 Arctic Council, "Arctic Environment Protection Strategy: Declaration on the Protection of Arctic Environment," 1991, http://www.arctic-council.org/index.php/en/document-archive/category/4-founding-documents#.

48 Arctic Council, "Declaration on the Establishment of the Arctic Council: Joint Communique of the Governments of the Arctic Countries on the Establishment of the Arctic Council," 1996, http://www.arctic-council.org/index.php/en/document-archive/category/4-founding-documents#.

49 Ibid.

50 Arctic Council, "Arctic Council Rules of Procedures: as adopted by the Arctic Council at the First Arctic Council Ministerial Meeting," 1998 (Revised 2013), http://www.arctic-council.org/index.php/en/document-archive/category/4-founding-documents#.

51 Arctic Council, "The Kiruna Declaration, The Eighth Ministerial Meeting of the Arctic Council," 2013, http://www.arctic-council.org/index.php/en/document-archive/category/5-declarations#.

52 Arctic Council, "Declaration on the Establishment of the Arctic Council: Joint Communique of the Governments of the Arctic Countries on the Establishment of the Arctic Council."

53 Koji Sekimizu, "Arctic Council- Meeting of Senior Arctic Officials" IMO, http://www.imo.org/MediaCentre/SecretaryGeneral/SpeechesByTheSecretaryGeneral/Pages/arcticcouncil.aspx.

54 Joint Staff-MN//ACT. *Multinational Experiment 7: Outcome 1: Maritime Security Region: The Arctic*. Suffolk, Virginia, July 2013, http://www.dtic.mil/dtic/tr/fulltext/u2/a582686.pdf.

all of these nations have territory in the Arctic, only five nations are Arctic littoral states and are referred to as the A5. The Arctic council holds a central position and includes other non-state actors, like indigenous communities, of which six have permanent member status.[55] There are 12 observer nations,[56] 9 intergovernmental and inter-parliamentary organizations,[57] and 11 non-government organizations that are granted an "observer" status in the Arctic council.[58] Figure 7 provides an overview of the construct of the Arctic council. As a policy-shaping rather than decision-making body, the Arctic council has proven to be an effective mechanism for fostering Arctic cooperation. However, with serious economic exploration of the Arctic in the near future, there is a need for institutionalizing the universal legal regulations on the rights, privileges, and responsibilities of Arctic and non-Arctic states pertaining to security issues, which is not part of the Arctic Council.

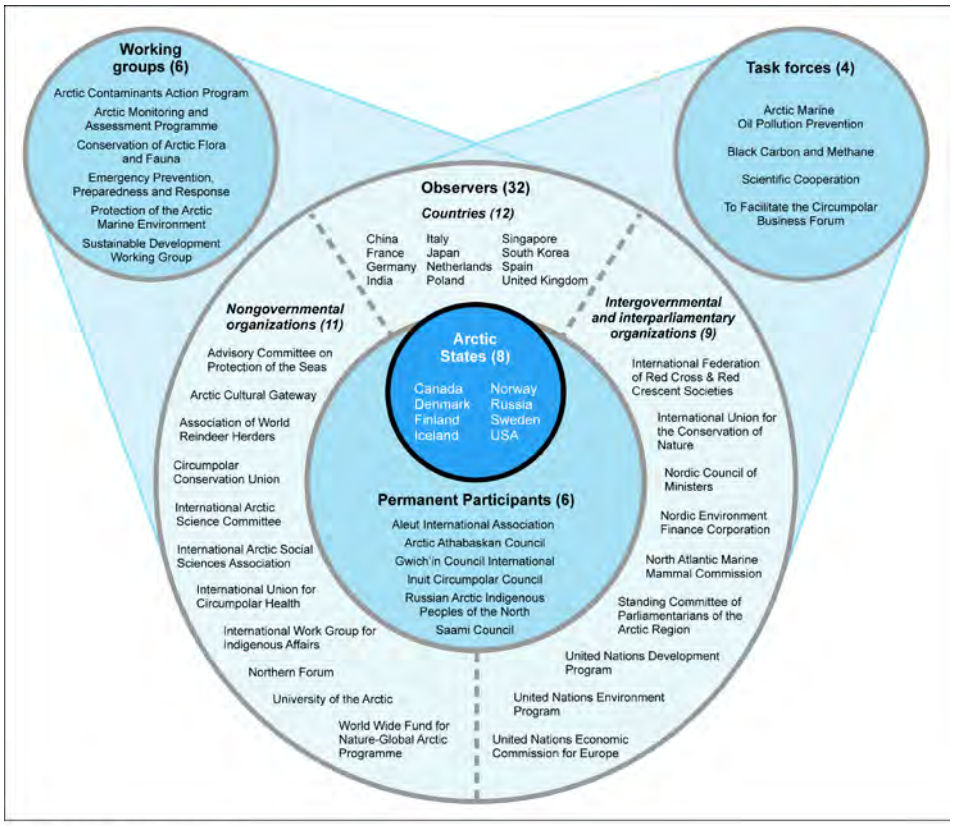
The Chairmanship of the Arctic Council is a rotating position among the Arctic States, taking place every two years. Currently, 2013–2015, Canada holds the Chairmanship. The United States will assume the position for 2015–2017.

[55] Arctic Athabaskan Council (AAC), Aleut International Association (AIA), Gwich'in Council International (GCI), Inuit Circumpolar Council (ICC), Russian Association of Indigenous Peoples of the North (RAIPON), Saami Council (SC).

[56] Germany, The Netherlands, Poland, Spain, United Kingdom, People's Republic of China, Italian Republic, State of Japan, Republic of Korea, Republic of Singapore, Republic of India.

[57] International Federation of Red Cross and Red Crescent Societies (IFRC), International Union for the Conservation of Nature (IUCN), Nordic Council of Ministers (NCM), Nordic Environment Finance Corporation (NEFCO), North Atlantic Marine Mammal Commission (NAMMCO), Standing Committee of the Parliamentarians of the Arctic Region (SCPAR), United Nations Economic Commission for Europe (UN-ECE), United Nations Development Program (UNDP), United Nations Environment Program (UNEP).

[58] Advisory Committee on Protection of the Seas (ACOPS), Arctic Cultural Gateway, Association of World Reindeer Herders (AWRH), Circumpolar Conservation Union (CCU), International Arctic Science Committee (IASC), International Arctic Social Sciences Association (IASSA), International Union for Circumpolar Health (IUCH), International Work Group for Indigenous Affairs (IWGIA), Northern Forum (NF), University of the Arctic (UArctic), World Wide Fund for Nature-Global Arctic Program (WWF).



Source: GAO analysis of Arctic Council information.

Figure 7. Overview of the members and observers of the Arctic Council.[59]

a. The Ilulissat Declaration

The inaugural Arctic Ocean Conference was held on May 27–29, 2008. The conference was a gathering of the five Arctic littoral states at the invitation of the Danish Minister of Foreign Affairs and the Premier of Greenland to discuss matters pertaining to shipping regulations and the environmental implications of increased shipping traffic.[60] Interestingly, the only countries invited to the conference were Canada, Denmark, Norway, Russia, and the United States, which comprised the A5. As the Declaration implies, the specificity of the invitations is due to the Arctic coastlines and the countries' ability to not only defend their national sovereignty, but to project reinforcement of the

[59] United States Government Accountability Office, "Arctic Issues: Better Direction and Management of Voluntary Recommendations Could Enhance U.S. Arctic Council Participation," 2014, http://www.gao.gov/assets/670/663245.pdf.

[60] Ilulissat Declaration, "Arctic Ocean Conference." *Ilulissat, Greenland* 27 (2008), http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf.

Law of the Sea.[61] Paragraph 6 summarizes the essence of the imminent concern for creating a basis for safety in the Arctic, not only to the environment as so many of the previous organizations highlight, but also to the increase of humans as research and commerce increase in the region. Paragraph 6 of the Ilulissat Declaration states:

> The increased use of Arctic waters for tourism, shipping, research and resource development also increases the risk of accidents and therefore the need to further strengthen search and rescue capabilities and capacity around the Arctic Ocean to ensure an appropriate response from states to any accident. Cooperation, including on the sharing of information, is a prerequisite for addressing these challenges. We will work to promote safety of life at sea in the Arctic Ocean, including through bilateral and multilateral arrangements between or among relevant states.[62]

The purpose behind the specific invitations and topics of discussion are based on the global and economic influence that each of the five states wish to project into the Arctic as the region evolves. These countries' adherence to proper stewardship of the Arctic will have a tremendous effect on setting the conditions for non-Arctic States' involvement in the region.

b. Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic

During the 2009 Ministerial Meeting in Tromsø, Norway, a "Task Force" was formed, and SAR responsibilities in the Arctic were assigned.[63] Members of the meeting consisted of the eight members of the Arctic Council. It was the first international agreement made specifically for the Arctic, resulting in clearly delineated boundaries of SAR areas of responsibility (AOR) as outlined in Figure 8. Additionally, outlined are the expectations of each participating state to maintain an adequate SAR capability within their AOR.[64] The requirement to establish and maintain respective SAR Coordination

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61 Ibid.

62 Ibid.

63 U.S. Department of State, "Secretary Clinton Signs the Arctic Search and Rescue Agreement with Other Arctic Nations," Office of the Spokesman, 2011, http://www.state.gov/r/pa/prs/ps/2011/05/163285.htm.

64 International Federation of Red Cross and Red Crescent Societies, "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic," 2011, 3, http://www.ifrc.org/docs/idrl/N813EN.pdf.

Centers for the Arctic are stated, including the locations and duties of the centers. The Government of Canada maintains the document; however, the agreement is an internationally recognized order of responsibility for SAR responsibilities and boundaries, as provided by the International Federation of Red Cross and Red Crescent Societies.[65] The result of the agreement is the jointly published *International Aeronautical and Maritime Search and Rescue Manual*, which ships are required to carry according to the International Maritime Organization and the Safety of Life at Sea Convention.[66] The resulting manual, agreement, and all other amendments are continually updated based on the necessity of mutually sharing information and the evolution of the region.

[65] Ibid.

[66] International Maritime Organization, "IAMSAR Manual," 2014, http://www.imo.org/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/SearchAndRescue/Pages/IAMSARManual.aspx.

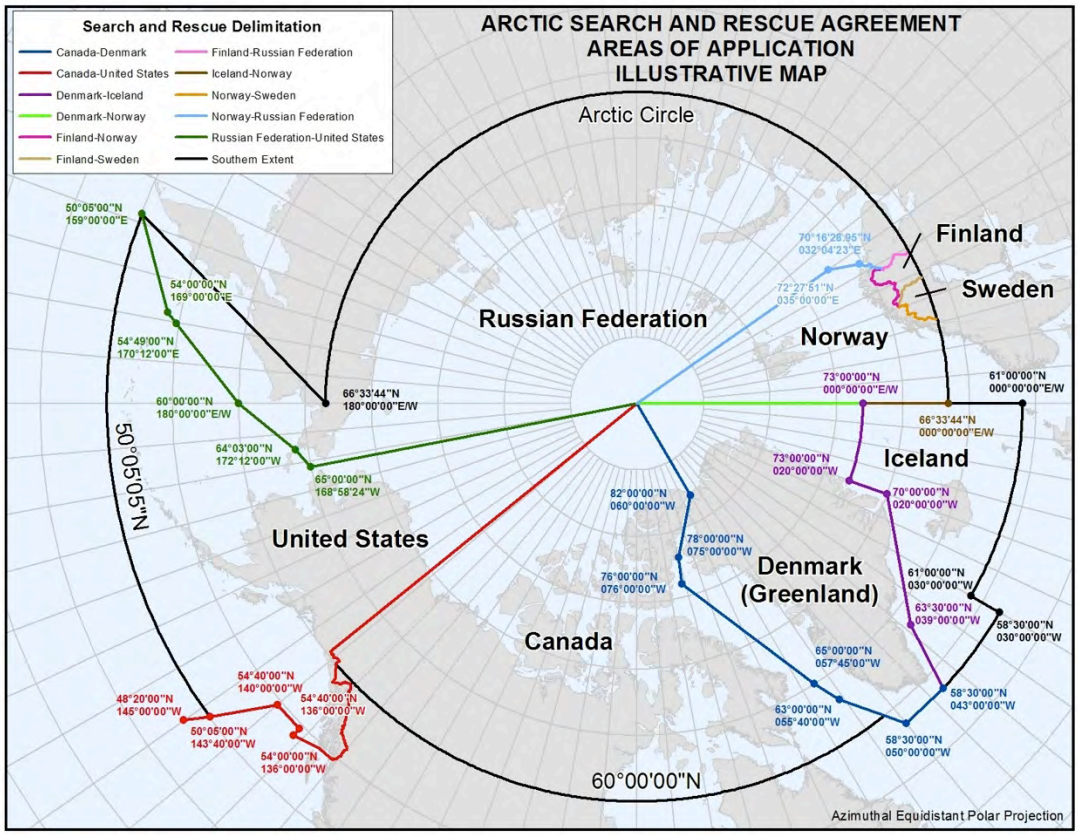

Figure 8. SAR areas of responsibility in the Arctic region.[67]

2. The United Nations

The United Nations (UN) plays a central role in the Arctic; this section lays out the various bodies under the UN pertaining to the Arctic.

a. United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea (UNCLOS) came about in 1973 after years of contested rights over fishing and exclusionary economic sea-shelf zones.[68] The initial draft of the UNCLOS was adopted in 1982, and has since been

[67] Arctic Portal: The Arctic Gateway, "Arctic Search and Rescue Agreement," http://www.arcticportal.org/features/751-arctic-search-and-rescue-agreement.

[68] United Nations Division for Ocean Affairs and the Law of the Sea, "The United Nations Convention on the Law of the Sea (A Historical Perspective)," Exclusive Economic Zone, http://www.un.org/depts/los/convention_agreements/convention_historical_perspective.htm.

ratified by 165 countries and the European Union.[69] The Convention maintains the rights and limits of the sea and territorial limits of undersea areas.[70] The Convention gives equal representation to states, regardless of their size and naval status.

In addition to protecting the rights of smaller states and their sea territories, the Convention provides laws for littoral passage that prevent countries from circumnavigating large areas for travel through coastal states' territories. Any disputes among Convention members are handled either through state-to-state talks, or, should talks between states fail, arbitrated by the International Tribunal for the Law of the Sea.[71] As maritime traffic and resource exploration increases in the Arctic, the laws and limits for such activities will become increasingly significant. The UNCLOS will also have to prove its worth—to prevent conflict—once disputes over territorial claims are to be settled. Where most other international organizations involved in the Arctic specifically will not discuss matters of military activity, the UNCLOS is the only governing organization that will address matters of international security, including the use of military force in the Arctic.

Currently, all Arctic States are members of the UN; however, the United States has not ratified the UNCLOS.[72] Although the United States continues to contribute to maritime research and security with the largest navy in the world, its non-ratification of the UNCLOS precludes the United States from disputing matters on the law of the sea, nor being bound by its provisions.[73] Under the UNCLOS, the UN is the most legitimate security organization in international waters of the Arctic.

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69 United Nations Division for Ocean Affairs and the Law of the Sea, "Status of the United Nations Convention on the Law of the Sea," table recapitulating the status of the Convention and of the related Agreements, 2014, http://www.un.org/depts/los/reference_files/status2010.pdf.

70 Division for Ocean Affairs and the Law of the Sea, "The United Nations Convention on the Law of the Sea (A Historical Perspective)."

71 Ibid.

72 U.S. Arctic Research Commission, "Report on the U.S. Arctic Research Commission Goals and Objectives for Arctic Research, For the U.S. Arctic Research Program Plan: 2013–2014," 17, http://www.arctic.gov/publications/goals/usarc_goals_2013-14.pdf.

73 United Nations, "Division for Ocean Affairs and the Law of the Sea: The United Nations Convention on the Law of the Sea (A Historical Perspective)," The Convention.

b. United Nations Commission on the Law of the Continental Shelf

The purpose of the United Nations Commission on the Limits of the Continental Shelf (UNCLCS) is to settle claims on outer-continental shelf boundaries beyond 200 miles of the coastal state.[74] Figure 9 gives a detailed overview of how territory, waters, and airspace, including the exclusive economic zone and the continental shelf, are defined under international law. The UNCLCS is directed in accordance with the CLCS *Rules of Procedure of the Commission on the Limits of the Continental Shelf*, April 17, 2008.[75] The CLCS provides a definition of *continental shelf* in Article 76, Part IV of the UNCLOS.[76] States who are party to the UNCLCS have ten years from the time they ratify the UNCLOS to make a claim for settlement of outer-continental shelf boundaries. However, additional consideration is given for extenuating circumstances under which states have yet to ratify the UNCLCS, such as is the case with the United States. This Commission was the deciding body for matters of boundaries in the Antarctic between the seven states sharing territorial boundaries, and is becoming increasingly important in the Arctic for similar circumstances.[77]

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74 United Nations Division for Ocean Affairs and the Law of the Sea, "Commission on the Limits of the Continental Shelf (CLCS) Purpose, Functions and Sessions: Purpose of the Commission.

75 United Nations Division for Ocean Affairs and the Law of the Sea, "United Nations Convention on the Law of the Sea, CLCS/40/Rev. 1: Commission on the Limits of the Continental Shelf," 2008, http://www.un.org/depts/los/clcs_new/commission_documents.htm.

76 Commission on the Limits of the Continental Shelf (CLCS): Part VI: "Continental Shelf," The Definition of the Continental Shelf and Criteria for the Establishment of its Outer Limits, 2013, http://www.un.org/depts/los/convention_agreements/texts/unclos/part6.htm.

77 Richard C. Powell, and Klaus Dodds, eds., *Polar Geopolitics? Knowledges, Resources* and *Legal Regimes* (Northampton, MA: Edward Elgar Publishing, 2014), 47–50.

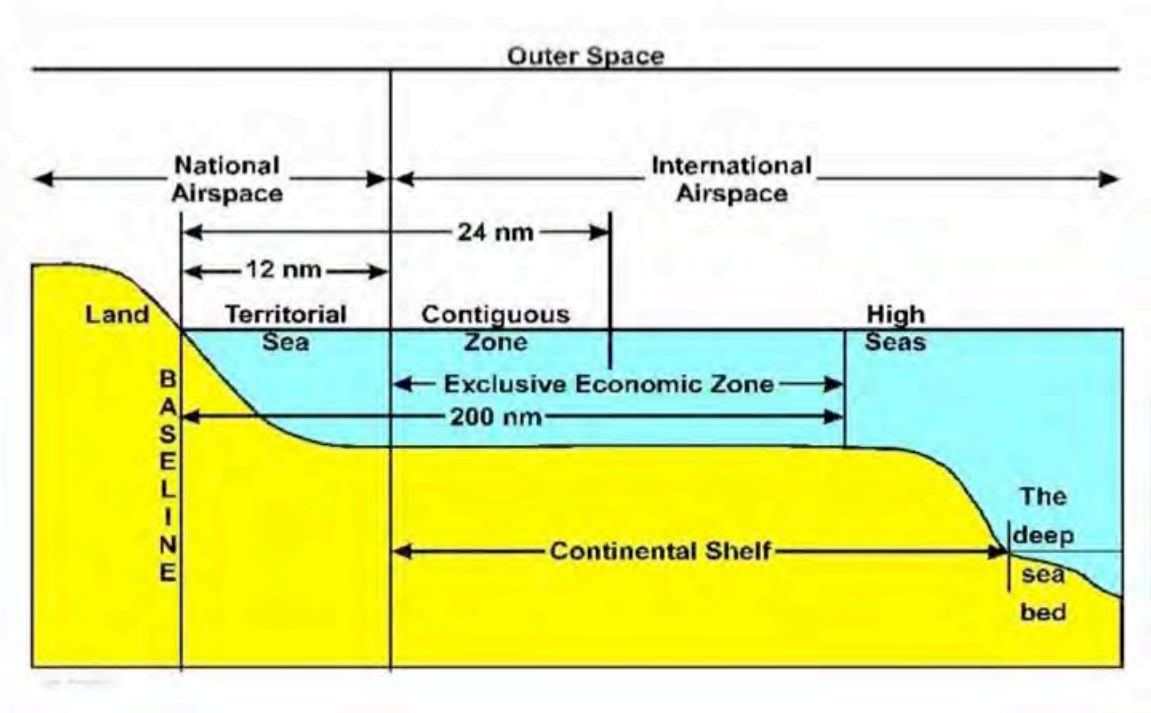

Figure 9. Ocean and air boundaries.[78]

c. International Maritime Organization

The IMO is a specialized agency of the UN that primarily handles matters of maritime security, pollution, and safety between international parties.[79] The IMO consists of 170 UN member countries, to include the United States, Denmark and the Netherlands. Additionally, the provisions of the UNCLOS are relevant to the IMO for adjudication.[80] The IMO's cornerstone initiative is the standards and codes for which polar-bound ships are constructed and maintained by. This "Polar Code" also sets the navigational boundaries for shipping routes and exploratory activity in the arctic regions.[81] More

[78] Naval War College, Joint Maritime Operations, Block 2.1 "Operational Warfare at Sea," PowerPoint slide 22, https://cle.nps.edu/xsl-portal/site/20df2175-9742-4c7a-a97e-7e96c9b86039/page/838b0d24-2fbc-4723-b8a0-b84d092dad14.

[79] International Maritime Organization, "IMO: What it Is," IMO website, 2013, 4, http://www.imo.org/About/Documents/What%20it%20is%20Oct%202013_Web.pdf.

[80] International Maritime Organization, "Particularly Sensitive Sea Areas," IMO website, http://www.imo.org/OurWork/Environment/PollutionPrevention/PSSAs/Pages/Default.aspx.

[81] International Maritime Organization, "Shipping in Polar Waters: Development of an International Code of Safety for Ships Operating in Polar Waters (Polar Code)," IMO website, 2014, http://www.imo.org/MediaCentre/HotTopics/polar/Pages/default.aspx.

importantly, however, is the fact that the Polar Code will prescribe procedures and responsibilities for search and rescue operations in Polar waters.[82] The emphasis of the Polar Code is on the protection of Particularly Sensitive Sea Areas (PSSA). PSSAs are areas that are recognized for their "ecological or socioeconomic or scientific" importance and are vulnerable to damage by international maritime activity.[83] Currently, the IMO does not recognize any PSSAs in the Arctic; however, the increase of maritime traffic for commercial and exploratory opportunities is expected to affect ecological vulnerabilities in the Arctic.

Topics of penalties and adjudication of the Polar Code have not been addressed yet, as the code has been scheduled for approval in May 2014. However, if approval of the Polar Code is reached, under this agreement, members of the IMO will be equally bound by the standards and regulations contained in the code, regardless of their status in the UNCLOS.

3. Other Authorities

Besides the UN there are other supra-state authorities involved in the governance of the Arctic.

a. International Seabed Authority

The International Seabed Authority (ISA) organizes and controls activities pertaining to the administration of resources beyond national jurisdiction.[84] The organization adjudicates over the seabed area outside of national control, and administers regulatory authority over activity revolving around seabed mining.[85] ISA was initially established under the UNCLOS, and later became an autonomous international organization in June 1996. Since gaining autonomy, the ISA has continued to grow in

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[82] Ibid.

[83] International Maritime Organization, "Particularly Sensitive Sea Areas."

[84] International Seabed Authority, "About Us," ISA website, 2007–2013, http://www.isa.org.jm/en/about.

[85] International Seabed Authority, "Frequently Asked Questions," No. 9, ISA website, 2007–2013, http://www.isa.org.jm/en/about/faqs#9.

membership and influence over matters of deep-seabed mining and exploration. Membership is divided into Council positions and Observer positions. The current Council list consists of 166 members, of which includes Denmark and the Netherlands.[86] The current number of observer states is 32, including the United States.

There is very little unclaimed seabed in the Arctic. Figure 10 shows the international sea boundaries including unclaimed, current, and potential continental shelf claims. Only a small amount of the Arctic Ocean seabed remains unclaimed; however, a great deal of the area in the Arctic remains subject to continental shelf claims.[87] The ISA, in conjunction with the UNCLOS, will be the authoritative organization for such matters.[88]

86 International Seabed Authority, "Member States," ISA website, 2007–2013, http://www.isa.org.jm/en/about/members/states.

87 Powell and Dodds, *Polar Geopolitics? Knowledges, Resources and Legal Regimes*, 29.

88 International Seabed Authority, "Frequently Asked Questions," No. 9.

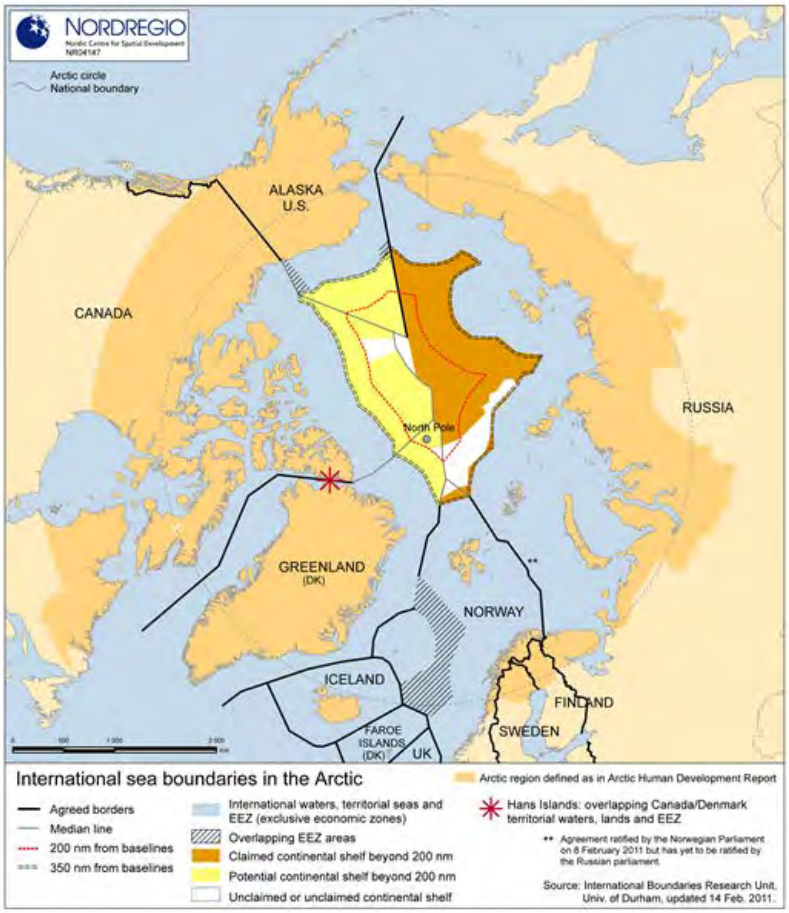

Figure 10. International sea boundaries in the Arctic.[89]

4. Conclusion

Several states are members of the administrating and governing bodies pertaining to the Arctic waters, with varying degrees of participation in each. For example, the United States has member status in the IMO and Arctic Council, and observer status in both the UNCLOS and the ISA. China has member status in the IMO, ISA, and UNCLOS, and observer status in the Arctic Council. Russia has member status in the IMO, the ISA, the UNCLOS, and the Arctic Council. However, it is important to note that among all of the international organizations mentioned above, not one has been

[89] NORDREGIO, Nordic Center for Spatial Development, NORDREGIO website, http://www.nordregio.se/templates/nordregio/pages/tni.aspx?imgurl=/Global/Maps/Per%20theme/07%20Cooperations%20and%20eligible%20areas/04147%20sea%20boundaries%20arctic.jpg&imgwidth=55.

charged with the responsibility of security governance in the Arctic. As the reader will see in the next section, each of the Arctic states, as well as Arctic observers, have their own strategy, each with generally similar regards for environmental stewardship, as well as individual national interests. It is possible that the open communications held in these venues by each of the representatives to date have been the reason for the successful prevention of militarizing of the Arctic.[90]

C. ARCTIC STRATEGIES AND POLITICAL ARCTIC ENVIRONMENT

The prospects of a further opening of the Arctic Ocean has led both the surrounding, and some extra-regional states and groups of states, to promulgate specific national Arctic strategies. Some of these strategies include references to an increased effort in the development of military forces with improved capability of operating in the Arctic.[91] A close study of the strategies, concrete procurement and force plans of the "Arctic Five," indicate that the effort is being placed in capacities geared more for surveillance, patrol, presence in areas of jurisdiction, and protection of sovereignty, than for war fighting and conflict.[92]

1. The Arctic Five Strategies

The strategies of the Arctic Five (Canada, Denmark, Norway, Russia, and the United States), or A5, are codified in separate documents, each pointing out the goals and priorities in the region in an enumerated manner. The strategies are also all relatively new documents, coincidentally timed with the increasing access to natural resources and maritime routes. The first signs of significant changes in the Arctic were noted in 2006–2009, coincidental with the U.S. Geological Survey estimate that there *might* exist 90 billion barrels of undiscovered oil in the region. The potential for such large prospects has most likely had something to do with the recent promulgation of Arctic strategies.

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[90] Powell and Dodds, *Polar Geopolitics? Knowledges, Resources and Legal Regimes*, 45.

[91] U.S. Department of Defense, Joint Staff-MN/ACT, "Multinational Experiment 7: Outcome 1: Maritime Security Region: The Arctic," 16.

[92] Ibid.

Prior to this estimate from the U.S. Geological Survey, Arctic strategies were either nonexistent or vague and inconsequential.

There are common themes throughout all of the strategies, emphasizing environmental stewardship and the importance of cooperation and diplomacy. However, there are some specific ambitions within each of the strategies regarding the protection of sovereign rights and the promotion of economic development, respectively. Canada's strategy, titled "Our North, Our Heritage, Our Future," is built on the themes mentioned above, but also integrates themes of independence and sovereignty. Denmark's strategy encompasses Denmark, Greenland, and the Faroe Islands and places less stress on sovereignty and more emphasis on cooperation and safety. However, it should be noted that Denmark currently has more disputes for land and boundary claims than any of the other Arctic states. Norway's "High North Strategy" is a rather specific document, with objectives including "development of petroleum in the Barents Sea," and "strengthening cooperation with Russia."[93] Russia's strategy is also specific with an emphasis on security, research, and protection. Particularly aggressive, Russia's strategy is the only one that specifically mentions their armed forces' posture in the region. The most specific and extensive strategy produced for the Arctic come from the United States. Not an extensive document in itself, the United States initially published the "National Strategy for the Arctic Region," which was in line with the aforementioned common themes. The more extensive aspects of the U.S. strategy are contained in the Department of Defense, Navy, and "Plan for Implementation," where detailed steps for accomplishing U.S. goals in the Arctic, timelines, and lead departments for accomplishing each are described. An extensive summary of all A5 strategies can be found in Appendix B.

2. Other Stakeholders

As mentioned in Chapter I, the list of stakeholders in the Arctic goes beyond the A5 or Arctic eight. The following describes three Arctic stakeholders, which are all

[93] Ministry of Foreign Affairs, "The Norwegian Government's High North Strategy," December 1, 2006, http://www.regjeringen.no/upload/Ud/Vedlegg/strategien.pdf.

relevant and show the diversity of state and supra-state involvement relevant to this study.

a. The Netherlands

Although a non-Arctic state, the Netherlands has been involved in the Arctic region for many centuries. The Barents Sea is named after the Dutch explorer Willem Barentsz, who spent a winter on Novaya Zemlya in 1596–1997 in his quest for a Northern sea route to Asia. As a maritime and seafaring nation, the Netherlands has a great interest in Arctic affairs, and is one of the first observer nations within the Arctic Council.[94] Recently, the Dutch Ministry of Foreign Affairs has issued a "Policy Framework for the Polar Regions (2011–2015)," to strengthen the international legal order, defend Dutch economic interests (e.g., fostering a knowledge economy and securing a meaningful role for the business community) and protecting global public goods (such as the climate, biodiversity, and energy).[95] The main justifications for the current Dutch polar policy are:

- A detailed understanding of the mass balance of the polar icecaps—and thus rising sea levels—is in the Netherlands' national interest.
- An obligation to promote the international legal order, a key objective of government policy for decades and enshrined in the Dutch constitution.
- Environmental protection is a top priority of Dutch polar policy.
- As one of the world's 20 largest economies, the Netherlands should play a role in managing global public goods.
- Economic interests, with the extraction of oil and gas and the fishing and shipping becoming commercially viable for Dutch businesses.[96]

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[94] Observer status in the Arctic Council is open to: (1) non-Arctic states, (2) inter-governmental and inter-parliamentary organizations, and (3) non-governmental organizations. So far, 12 non-Arctic countries, nine intergovernmental, and 11 non-governmental organizations have been given observer status, http://www.arctic-council.org/index.php/en/.

[95] Dutch Ministry of Foreign Affairs, "The Netherlands and the Polar Regions, 2011–2015," 3, http://www.rijksoverheid.nl/documenten-en-publicaties/notas/2013/03/06/beleidskader-nederland-en-de-poolgebieden-2011-2015.html.

[96] Ibid.

The main points for Dutch policy principles and objectives for the Arctic region are:

- Contribute to the multilateral Arctic administrative structure, taking its lead in the maritime areas from the UNCLOS (1982).
- Ensure that the exploitation of oil and gas takes place under very strict environmental and security standards. This should be assessed in the light of the special vulnerability of the Arctic environment and the position of the indigenous peoples.
- Support, in response to demand, research, and development on safeguarding the sustainability of Arctic shipping and offshore technology.
- Contribute proportionally to creating a network of protected marine areas in the North Pole region.
- Protecting and preserving Arctic biodiversity.[97]

From a military perspective, during the Cold War the Netherlands contributed to the defense of NATO's 'Northern Flank' in Norway. This materialized by contributing Dutch Marines and Dutch Navy and amphibious shipping to the United Kingdom/Dutch Amphibious Force. To date, the Netherlands also contributes to the bi-annual NATO exercise Cold Response in Norway. With two Marine battalions and SOF units trained and equipped to operate in an Arctic environment, plus the ability to project and sustain these forces through its Naval Expeditionary and Air Force units, the Netherlands has the ability to conduct military operations in the Arctic region.[98]

b. China

Although the People's Republic of China lies some distance from the Arctic, China has displayed a "growing interest in the region."[99] China received observer status

97 Ibid., 4.

98 Arctic and cold-weather capable is not the same within the Netherlands DOD. Arctic capable is defined as being able to operate within the Arctic Circle (N66°, 33', 44").

99 Ronald O'Rourke, *Changes in the Arctic: Background and Issues for Congress* (CRS Report No.R41153) (Washington, DC: Congressional Research Service, 2011), 55.

in the Arctic Council in 2013, and "…Chinese leaders have begun to promulgate the notion that China is a 'near-Arctic state' and a 'stakeholder' in arctic affairs."[100]

At the time of writing, China has the second-largest economy in the world. China has an interest in the Arctic, as its economy is increasingly dependent on export.[101] "Beijing is keenly interested in having free access to the future northern waterways, which would drastically reduce both sailing times and transportation costs."[102] The NSR saves significant shipping time and costs.[103] September 2013 marked the first Chinese commercial cargo ship to traverse the NSR. Furthermore, "China is the world's largest consumer of raw materials and hydrocarbon resources."[104]

> Other observers have argued that China's interest is motivated in the Arctic's emerging status as "the new fishing grounds—the world's largest storehouse of biological protein. … Finally, some have also interpreted China's growing interest in the Arctic as further evidence of its effort to expand its influence as a global player: "They know that [the] Arctic may be one of the hot spots of the 21st century.[105]

Chinese Arctic affairs are handled by the State Oceanic Administration (SOA). The SOA oversees the Chinese Arctic and Antarctic Administration which conducts all Polar matters of research and international engagement on behalf of China.[106] The state-run Yellow River Station is in Ny-Alesund, thus Norway heavily influences China's Arctic involvement from where Arctic-related research is conducted.[107] To date, China has not publicly released an Arctic Strategy. However, "In recent years, China has been

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100 Shiloh Rainwater. "Race to the North: China's Arctic Strategy and Its Implications," *Naval War College Review* 66, no. 2 (2012): 63.

101 Some analysts have estimated that as much as one-half of China's GDP is reliant upon exports and shipping. Source: O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 55.

102 Ibid.

103 China's strategic Arctic interests, *Strategic Comments* 20, no. 22, i–ii, doi:http://dx.doi.org/10.1080/13567888.2014.914777.

104 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 55.

105 Ibid.

106 COMNAP, Chinese Arctic and Antarctic Administration, https://www.comnap.aq/Members/CAA/SitePages/Home.aspx.

107 As of 2013, according to China's twelfth five-year plan, three additional expeditions to the North Pole by 2015 are being planned. Rainwater, "Race to the North: China's Arctic Strategy and its Implications."

cultivating relationships with the Nordic countries…. In April 2013, China and Iceland signed a free trade agreement—China's first such pact with a European government." Three major Chinese oil companies have also entered into "a framework agreement with Russia's Novatek to gain access to Russia's Arctic gas fields."[108]

It seems that Chinese interest in the Arctic is quite profound. This combined with the notion that, "many Chinese believe that the Arctic should be considered as part of the global commons,"[109] is conflicting with A5 perceptions, and may require further attention. Though Chinese foreign policy officially rests on respect for territorial integrity, indications do exist that China may be encouraged to challenge Canadian sovereignty claims in the Arctic.[110] In short, increased Chinese interests in the Arctic have created greater cooperation with several Arctic nations; however, this increased Arctic focus has also highlighted potential issues for Sino-Arctic conflicts of interest.

c. European Union

The European Union consists of 28 European countries, connected in the interest of economic and political cooperation.[111] The European Union (EU) is currently pending a status change request from Ad-Hoc to Observer status, with the decision to be made at the next Arctic Council meeting in Canada in 2015. As indicated by the "Council conclusions on developing a European Union Policy towards the Arctic Region," the EU will also take proposals for the development of the EU Arctic Policy, on or around December of 2015.[112] Three permanent members of the Arctic Council are also members of the EU (Denmark, Sweden, and Finland). The regulatory authority that the European Union has extends into the Arctic due to the location of the member states in the Arctic. With the recent application of Iceland to the EU, the EU authority could extend further into Arctic waters by way of the European Economic Area, creating implications for

108 Craig H. Allen. "Arctic Law and Policy Year in Review: 2013," The University of Washington.

109 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 55.

110 Ibid.

111 European Union, "How the EU Works," http://europa.eu/about-eu/index_en.htm.

112 Council of the European Union, "Council Conclusions on Developing a European Union Policy towards the Arctic Region," Foreign Affairs Council meeting, Brussels, May 12, 2014, http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/EN/foraff/142554.pdf.

European security forces for the Arctic area.[113] The EU will continue to increase its participation on matters in the Arctic, primarily through its recently established Arctic Forum.[114]

D. CURRENT DISPUTES AND CLAIMS

> The Arctic, then, is not a global commons or terra nullius like its opposite pole, Antarctica. Instead, its geopolitics are informed by the interests, whether direct or indirect, conflicting or communal, of states whose territory lies partly or entirely in the earth's most northerly regions.
>
> Natalie Mychajlyszyn

The scope for this segment is not to indicate a large conventional conflict is looming in the future. "Geopolitical issues are not exclusively conflicts over interests, although such concerns tend to dominate."[115] For further insight on what those disputes and claims may result in, and how this will place the stakeholders at the negotiation table—and how this might affect political negotiations once bargaining begins in the Arctic—see the game theory analysis in Appendix C, where two of the four mentioned current disputes, plus a hypothetical NATO versus Russia dispute, are included.

The opening of the Arctic offers opportunities for increased commerce and resource exploitation, not only to the Arctic states, but to nearby surrounding states, and powerful global economies trying to gain foothold in an evolving region. While the pursuit of natural resources is the highest priority of some states, shorter shipping routes are the focus of others.[116] Like many other previously developing regions around the world (e.g., the Persian Gulf), the Arctic is a region with "competing and complementary interests."[117]

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113 The Institute for Foreign Policy Analysis, "New Strategic Dynamics in the Arctic Region," 2012, 150, http://www.ifpa.org/pdf/StrategicDynamicsArcticRegion.pdf.

114 Ibid., 153.

115 Ibid., 3.

116 Walter & Duncan Gordon Foundation, "Interests and Roles of Non-arctic States in the Arctic: Report," Munk School of Global Affairs, 2011, http://gordonfoundation.ca/sites/default/files/images/Arctic%20Seminar%20Report_3.pdf.

117 Mychajlyszyn, "The Arctic: Geopolitical Issues," 2.

The consensus-driven Arctic Council serves as a forum for the cooperation of Arctic states and other interested states on issues pertaining to the Arctic region.[118] "[C]ooperation frequently establishes a level of governance—in some cases formally, in others less formally—by which mutual understanding can clarify intentions and help to build trust."[119] The question then is, what happens to Arctic *cooperative* governance if cooperation does not continue to evolve or seize?

> Despite the existence of these councils and organizations, the Arctic is without a single, comprehensive, and developed regime by which to govern state behavior in the region. According to those who argue for such a regime, the councils and organizations that do exist are limited in scope, have unequal levels of membership, confuse decision-making procedures because of the variety of levels involved, and are generally ineffective.[120]

A specific problem is that the regional institutions, or governance, in the Arctic, like the Arctic council, explicitly refrain from dealing with "matters related to military security."[121] Through the IMO, the Polar Code (set for approval in November 2014) would be the defining body for the regulation of shipping standards as commerce and tourism vessels traverse the Exclusive Economic Zones (EEZs) and international waters.[122] The ISA administers matters pertaining to the extraction of natural resources from the seabed beyond states' EEZ. The authoritative organization for the submission and approval of claims to littoral boundaries is the UNCLCS, which is still not ratified by the United States, one of the largest stakeholders in the Arctic. This possibly adds to the sensitivity of the political climate in the Arctic, and to the unpredictability in how the United States will act when claims and disputes are settled. Finally, the UNCLCS is the most defining organization for matters of territorial boundaries in the Arctic. The UNCLCS is the receiving organization for submissions and claims for states' continental shelves, which set the mark for which all other boundaries and territories will be defined.

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118 Arctic Council, About the Arctic Council," April 2011, http://www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council.

119 Mychajlyszyn, "The Arctic: Geopolitical Issues," 4.

120 Ibid.

121 U.S. Department of Defense, Joint Staff-MN/ACT, "Multinational Experiment 7: Outcome 1: Maritime Security Region: The Arctic," 27.

122 International Maritime Organization, "Shipping in Polar Waters."

Currently, the submissions for claims waiting to be reviewed by the UNCLCS are not made publicly available. According to the U.S. Congressional Research Service Report R41153, there are only four unresolved disputes over territory in the Arctic.[123]

These include:

- Canada-U.S., EU, and others' NWP: Canada claims that the Northwest Passage is sovereign Canadian territory, and therefore gives way to Canadian right to surveillance, regulation, and control.[124]
- Canada-U.S. Beaufort Sea: The United States and Canada have been negotiating over the shared boundary from the coast into the Beaufort Sea.
- U.S.-Russia Bering Strait: The dispute between the United States and Russia over maritime boundaries in the Bering Strait has been is currently being negotiated, but has yet to be ratified by the Russian Federation.[125]
- Canada-Denmark Hans Island: "Some analysts believe the two countries are vying for control over a future sea lane [NWP]…. Others claim that the governments are staking out territorial claims in the event that future natural resource discoveries make the region economically valuable."[126]

The Russian and Canadian claims for the Lomonosov Ridge have yet to be officially disputed. Currently Russia is working to fortify and resubmit a 2001 rejected claim to the UNCLOS for the Lomonosov Ridge, at the odds of Canada who submitted an official claim with the UNCLCS to portions of the Lomonosov Ridge in 2013.[127]

The link between a relatively more accessible Arctic and resource exploitation is more complex than a simple cause and effect model would lead one to expect.[128] The link between Arctic resource exploitation and inter-state conflict has similarly been questioned. Because most of the known resources lay within the EEZs of the Arctic

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123 Mychajlyszyn, "The Arctic: Geopolitical Issues," 2.

124 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 17.

125 Kaj Hober, "Territorial Disputes and Natural Resources: The Melting of the Ice and Arctic Disputes," *Oil and Gas Journal* 109, no. 6 (2011), http://www.ogj.com/articles/print/volume-109/issue-6/exploration-development/territorial-disputes-and-natural-resources.html.

126 O'Rourke. *Changes in the Arctic: Background and Issues for Congress*, 18.

127 United Nations, Oceans & Law of the Sea, Division for Ocean Affairs and The Law of the Sea: Submissions to the Commission: *Partial Submission by Canada*, http://www.un.org/depts/los/clcs_new/submissions_files/submission_can_70_2013.htm.

128 Gongora, "Scoping Missions and Tasks for CANSOFCOM in the Canadian North," 10.

states, it can be assumed that each of the Arctic states has a vested interest in respecting and protecting the current status quo and its legal foundations, including Russia.[129]

[129] Ibid.

III. THE ARCTIC MILITARY ENVIRONMENT

The first part of this chapter lays out the doctrinal foundation for SOF, and is supported by the discussion of SOF and Joint doctrine in Appendix D. This analysis shows that SOF is particularly suited to operate in the sensitive political Arctic environment, and that SOF is well suited to sustain operations in the hostile Arctic geophysical environment, as long as these skills in reality are maintained. This segment also points out how SOF and joint doctrine may not adequately bridge the gap between A5 policy and the vignettes emerging later in this study. Great range is typically associated with naval or maritime SOF platforms, but maritime platforms are slow compared to Air SOF; however, Air SOF typically has shorter range than its maritime counterpart. This paradox needs to be analyzed further to balance the requirements of range versus response time, while overcoming the tyranny of distance in the Arctic, in order to provide SOF with a sufficient platform for infiltration and exfiltration, tactical mobility, and sustainment in the Arctic.

The second part of this chapter describes the current Arctic SOF capabilities of the three nations described in this thesis. As stated in Chapter I, given the diverse background of these three nations regarding their political stance, responsibilities, and military capabilities, this will provide an interesting insight into the relative military Arctic SOF capabilities and potential deficits.

In the third part, an overview of the current existing command and control facilities—military and civilian—are provided for the A5. This will show how intertwined and interdependent military and civilian infrastructure and institutions are in the current Arctic region. This part will discuss the current military cooperation organizations in place, and the potential role it will play in the future.

A. CURRENT MILITARY COOPERATION, COMMAND, AND CONTROL CAPABILITIES IN THE ARCTIC

This section will provide overview of the current military and civilian command and control (C2) structures and systems of the five Arctic littoral nations within the Arctic region. Furthermore, it will describe the different security organizations with potential interest in the Arctic region. This overview is useful for two reasons. First, it will provide insight into the general Arctic military capabilities of the different Arctic states, and their ability to detect and respond to contingencies in the Arctic region. Second, it will serve to highlight some of the biggest challenges in this region, including: (1) the lack of ability to communicate (especially North of the 70-degree north latitude), making effective C2 of any in the region extremely difficult; and (2) the lack of strategic, operational, and tactical mobility mostly as a result of the challenging distances or tyranny of distance, and the environment.

C2 is the exercise of authority by a designated commander over assigned forces and attached forces in the accomplishment of a mission.[130] The C2 centers of the different Arctic nations discussed in this section have very few military units directly under command. In case of an emergency or contingency, military units will be assigned to these commands to fulfill specific tasks.

One example of joint C2 in the Arctic region is the SAR agreement signed by the eight Arctic nations in 2011. The objective of this agreement is to strengthen aeronautical and maritime search and rescue cooperation and coordination in the Arctic.[131] The RCCs mentioned in the SAR agreement are often used together as military C2 centers, and are augmented by military resources. Therefore, one can assume that these RCCs could also be used to coordinate, command, and control military forces in case of any contingencies in the Arctic region.

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130 U.S. Department of Defense, *Joint Publication 1: Doctrine for the Armed Forces of the United States* (Washington, DC: March 2013), 27.

131 International Federation of Red Cross and Red Crescent Societies, "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic."

An interesting aspect in the SAR agreement is to see how the different Arctic nations deal with SAR. Although in some countries the Department of Defense (DOD) is the leading agency, in others it is the Ministry of Interior or Emergency. This highlights an important issue; every nation has organized its rescue and security forces in the Arctic differently. Therefore, the importance of interagency operations in a multinational environment is emphasized.

As a general point, before describing the C2 capabilities of the individual Arctic states and the security organizations involved in the Arctic, it is worthwhile noting that the Arctic today still lacks sufficient, mainly maritime, C2 infrastructure in order to facilitate economic development. Depending on the individual or collective military capabilities of the Arctic littoral nations, the same applies for the ability to execute military operations in the region.

1. Canada

The Canadian JTFN is one of the six regional commands reporting to the Canadian Joint Operations Command (CJOC) in Ottawa. JTFN is responsible for the conduct of all routine and contingency operations in Canada's North,[132] and has detachments in Whitehorse, Yukon, and Iqaluit, Nunavut. JTFN is headquartered in Yellowknife, North West Territories (NWT).[133] The most prominent military unit under JTFN command is the 1st Canadian Ranger patrol group.[134] Furthermore, Canada has three Joint Rescue Coordination Centers (JRCC), Trenton, Halifax, and Victoria. JRCC Trenton is located at the Canadian Forces Base (CFB) Trenton, operated by the Royal

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[132] Canada's North is defined by Canada as the area north of 60 degrees north latitude, including the Yukon Territory, the Northwest Territories, Nunavut, and Nunavik (the portion of northern Quebec north of 60N latitude); and all contiguous seas, including the Arctic Ocean, the Beaufort, the Lincoln and Labrador Seas, Baffin Bay, and the Davis Strait. The United States defines its Arctic as U.S. and foreign territory north of the Arctic Circle (66.5 degrees north latitude) and all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers. Source: United States Northern Command, and Canadian Joint Operations Command. *Framework for Arctic cooperation among North American Aerospace Defense Command*, December 11, 2012, http://www.sldinfo.com/wp-content/uploads/2012/12/Framework-for-ARCTIC-Cooperation.pdf.

[133] Defence R&D Canada: Centre for Operational Research & Analysis (DRDC CORA). "Arctic Planning Scenarios: Scenario #1 – Defence Scenario," July 2011, 37.

[134] Details of JTFN are at the Department of National Defense Website: http://www.forces.gc.ca/en/operations-regional-jtf-north/detachments.page.

Canadian Air Force (RCAF), and the Canadian Coastguard (CCG). JRCC Trenton is Canada's primary coordination center for responding to contingencies in the Arctic and is mentioned in the SAR agreement.

Established in 1958, North American Aerospace Defense Command (NORAD) is the United States and Canada bi-national organization charged with the missions of aerospace warning and control and maritime warning in North America.[135]

NORAD is formed according to the three geographic regions: Continental NORAD Region (CONR), Canadian NORAD Region (CANR), and Alaskan NORAD Region (ANR). While both CANR and ANR have responsibilities in the Arctic and are organized according to national boundaries, NORAD routinely conducts operations across these lines. For the mission of maritime warning, NORAD supports USNORTHCOM and CJOC in their assigned missions to defend North America.[136]

In September 2009, then Canada Command (Canada COM), NORAD, and USNORTHCOM signed the "Framework for Enhanced Military Cooperation," which codified the close relationships among the Commands and their supporting agencies to ensure a timely and coordinated response to defense and security challenges to North America.[137] This document was followed by a Tri Command Vision (in March 2010), and a Tri Command Strategy (in December 2012). After the establishment of the CJOC in 2012, a "Framework for Arctic Cooperation" was signed. This framework identified opportunities for potential Tri Command cooperation in the Arctic among NORAD, USNORTHCOM, and CJOC.[138] It furthermore supported the Tri Command Vision's stated goal to improve unity of effort among the three Commands and with our respective mission partners. Its immediate goal was to promote enhanced military cooperation in the

135 North American Aerospace Defense Command, "NORAD History," http://www.norad.mil/AboutNORAD/NORADHistory.aspx.

136 Framework for Arctic Cooperation among North American Aerospace Defense Command, United States Northern Command, and Canadian Joint Operations Command, December 11, 2012, 7.

137 Ibid., 4.

138 Ibid.

Arctic and identify specific areas of potential tri command cooperation in the preparation for and conduct of defense, security, and safety operations in the Arctic.[139]

2. Denmark

The Danish Arctic command or *Arktisk Kommando* (AKO) was established on October 31, 2012. The headquarters is located in Nuuk, Greenland, with a small liaison unit in Thorshavn on the Faroe Islands.[140] There are also Danish units in Kangerlussauq, Station North, the famous SIRIUS patrol in Daneborg, and at Mestersvig. The command also maintains a liaison unit at the Thule Air Base (Qaanaaq), which is operated by the United States. The Danish Arctic command is a merger of the Island Command Greenland and the Island Command Faroe Islands. The main tasks of the new command are a mix of military and law enforcement type missions, including: (1) the military defense of Greenland and the Faroe Islands; (2) surveillance and enforcement of sovereignty; (3) fisheries inspection; (4) search and rescue services; (4) military surveillance; (5) pollution prevention; (6) hydrographic surveys; and (7) various activities to support the civilian population.[141] The Danish Arctic Command is a territorial command with an area of responsibility that extends from the waters around the Faroe Islands to the east, the Greenland Sea and the Arctic Sea to the north, and across the Denmark Strait and the Irminger Sea to the Davis Strait and Baffin Bay between Canada and Greenland. Figure 11 provides an overview of the Greenlandic geography while also showing the proportions of the AKO territorial command.

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[139] Framework for Arctic Cooperation among North American Aerospace Defense Command, United States Northern Command, and Canadian Joint Operations Command, December 11, 2012, 4.

[140] Forsvaret,"Organization: Arctic," December 13, 2013, http://www2.forsvaret.dk/eng/Organisation/ArcticCommand/Pages/ArcticCommand.aspx.

[141] Ibid.

Figure 11. Geography of Greenland and AKO territorial command proportions.[142]

Through Denmark, Greenland has been part of NATO territory since 1955. The U.S. military involvement in the defense of Greenland is formalized in an important agreement signed in 2004.[143] This agreement supplements the agreement of April 27, 1951, where roles and responsibilities among NATO, United States, Denmark, and Greenland are outlined.[144]

142 Kamikposted.dk, "Online Discussion on Maritime Proportionality Distortion," http://www.kamikposten.dk/global/maskinrum/rutine/leksikon.aspx?tag=emne&folder=hvadermeningen&sprog=da&punkt=Turisme&udvalgt=2012092415463616e.

143 Agreement between the United States of America and Demark on the Defense of Greenland, August 6, 2004, http://www.state.gov/documents/organization/170358.pdf.

144 Nikolaj Petersen, "Negotiating the 1951 Greenland Defense Agreement: Theoretical and Empirical Aspects," *Scandinavian Political Studies*, Bind 21 (New Series) (1998).

The U.S. air base in Thule is home to the 21st Space Wing's global network of sensors providing missile warning, space surveillance, and space control to NORAD and Air Force Space Command. The base hosts the 12th Space Warning Squadron who operates a Ballistic Missile Early Warning System designed to detect and track intercontinental ballistic missiles (ICBMs) launched against North America. Finally, Thule is home to the northernmost deep-water port in the world.[145]

There are three RCCs in the Danish territories: Maritime Rescue Coordination Center (MRCC) Grønnedal; RCC Søndrestrøm/Kangerlussuaq, and MRCC Torshavn. The first two are located on Greenland, and the latter on the Faroe Islands.

3. Norway

In 2010, Norway became the first Arctic nation to move its military command center within the Arctic Circle, transferring the Norwegian Operational Command Headquarters (HQ) from Stavanger to Bodø.[146] Contingencies in the Arctic requiring military resources will likely be coordinated, commanded, and controlled through this HQ. Furthermore, Norway has multiple military bases north of the Arctic circle, mainly in Finnmark, from where military operations could be launched. As stated in the Norwegian Arctic strategy, "the presence of the armed forces increases predictability and stability, and is decisive for our ability to respond to emergencies in the High North."[147]

Norway has two main RCCs: JRCC Stavanger and Bodo. The latter is responsible for contingencies north of the 65N, and mentioned as such in the SAR agreement.

4. Russian Federation

In 2010, it was reported that Russia had reorganized its six military commands into four larger joint commands, Southern, Western, Eastern, and Central Command, see

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[145] Peterson Air Force Base, "Units: 821st Air Base Group," http://www.peterson.af.mil/units/821stairbase/index.asp.

[146] Rick Rozoff, "Top of the World: NATO Rehearses for War in the Arctic," Global Research, April 24, 2012, http://www.globalresearch.ca/top-of-the-world-nato-rehearses-for-war-in-the-arctic/30508.

[147] Norway Ministry of Foreign Affairs, "The Norwegian Government's High North Strategy," 19.

Figure 12. In this structure, Command West, headquartered in Moscow, is responsible for the Northern Fleet.[148]

Figure 12. New Russian military command structure.[149]

Reports stated that by the end of 2014, Russia would form a new Arctic command to protect its interests in the Arctic. "The new command will comprise the Northern Fleet, Arctic warfare brigades, air force and air defense units, as well as additional administrative structures."[150] According to the report, "The military structure will be responsible for protecting Russia's Arctic shipping and fishing, oil and gas fields on the

148 Trude Pettersen, "New Military Command System in Russia," Barentsobserver, October 25, 2010, www.barantsobserver.com.

149 Ibid.

150 Anna Yudina. "Russia to Set Up Arctic Military Command by 2015," RIA Novosti, February 17, 2014, http://en.ria.ru/russia/20140217/187620827/Russia-to-Set-Up-Arctic-Military-Command-by-2015.html.

Arctic shelf, and the country's national borders in the north."[151] According to multiple reports, this new command is going to be named "the Northern fleet—Strategic Joint Command."[152] This new command seems to be part of a bigger Russian plan to regenerate military presence and command and control facilities in the Arctic Region. President Vladimir Putin said, "A united system of naval bases for ships and next-generation submarines will be created in the Arctic to defend Russia's interests in the region."[153] The Russian Defense Ministry has already announced plans to reopen airfields and ports on the New Siberian Islands and the Franz Josef Land archipelago, as well as at least seven airstrips on the continental part of the Arctic Circle that were mothballed in 1993.[154] It seems that Russia is working hard to establish both military and civilian command and control infrastructure in the Arctic to be able to respond to any contingencies in the North. Although this Russian 'build up' is often viewed with suspicion by other Arctic nations, the 17,500 km of Russian Arctic shoreline,[155] should put things in perspective. This revitalization of Russian Forces in the North is underscores the Russian's need to protect what is left of the Russian strategic nuclear forces, and how the central role of these forces in securing Russia's "second strike" capability play in the Arctic.[156]

In his speech before the Russian Security Council on April 24, 2014, Russian President Vladimir Putin outlined six national priorities for the Arctic Region.[157]

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151 Ibid.

152 Foreign Military Studies Office, "Foreign News & Perspectives of the Operational Environment," http://fmso.leavenworth.army.mil/OEWatch/201403/Russia_10.html.

153 Sputnik International, "Russia to Build Network of Modern Naval Bases in Arctic – Putin," April 22, 2014, http://en.ria.ru/military_news/20140422/189313169/Russia-to-Build-Network-of-Modern-Naval-Bases-in-Arctic---Putin.html.

154 Ibid.

155 Kraska, *Arctic Security in an Age of Climate Change*, 138.

156 Ibid., 93.

157 These priorities are: (1) improve quality of government control, (2) implement measures of the state program Socioeconomic Development of the Arctic Zone of the Russian Federation through to 2020, (3) the legal formalization, in line with international law, of the outer boundary of Russia's continental shelf in the Arctic Ocean, (4) develop the best economic model for the development of the Northern Sea Route, (5) maintain environmental security, and (6) ensure comprehensive security of the Russian Arctic zone.

> Oil and gas production facilities, loading terminals and pipelines should be reliably protected from terrorists and other potential threats. Nothing can be treated as trivia here. All security issues should be practiced in the course of regular joint exercises and training involving units of the Defense Ministry, Emergencies Ministry and other services. We should also improve reliability of our Arctic border protection, including through strengthening the marine component of the border patrol groups of Russia's Federal Security Service. At the same time, we should enhance the military infrastructure. In particular, I am referring to the creation in our section of the Arctic of a single basing structure for new generation surface vessels and submarines.[158]

Two more rescue centers—in Murmansk and in Nadym—may open this year in the Russian Arctic. With three rescue centers recently opened in Naryan-Mar, Arkhangelsk, and Dudinka, this will bring the total to five rescue centers capable of responding to any urgent situations in the Arctic. This is part of a bigger plan of the Russian Emergencies Ministry, announcing plans to build ten integrated rescue centers by 2015 on Russia's Arctic coast.[159]

5. United States

As presented in this thesis, there are three geographical combatant commands and one functional combatant command that share responsibility for the Arctic region. These geographic combatant commands include: The United States Northern Command (NORTHCOM), European Command (EUCOM), and the Pacific Command (PACOM). The only functional combatant command is The United States Special Operations Command (USSOCOM). Important changes took place in April 2011, when President Obama assigned responsibility for the Arctic to NORTHCOM.[160] Furthermore, the April 2011 change in the DOD's Unified Command Plan (UCP) assigned Alaska to

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158 President Vladimir Putin, "The Implementation of Russia's State Policy in the Arctic in the Interests of National Security" (speech before the Russian Security Council in Moscow, April 22, 2014). A translation of the whole speech can be found at http://eng.state.kremlin.ru/security_council/7065.

159 Vladimir Baronov, RIA Novosti, May 27, 2014, http://en.ria.ru/russia/20140527/190168924/Russia-to-Build-2-More-Emergency-Rescue-Centers-on-Arctic-Coast.html.

160 For an article discussing the change, see Jim Garamone, "Unified Command Plan Reflects Arctic's Importance," American Forces Press Service, April 7, 2011.

NORTHCOM,[161] where previously NORTHCOM and PACOM had shared responsibility for Alaska and adjacent waters (Figure 13). In the same document, and again stated in the U.S. DOD Arctic Strategy of 2013, it states, "Commander U.S. Northern Command (CDRUSNORTHCOM) is responsible for advocating for Arctic capabilities. In execution of this responsibility, CDRUSNORTHCOM will collaborate with relevant Combatant Commands (COCOMs), the Joint Staff, The Military Departments and Services, and the Defense agencies to identify and prioritize emerging Arctic capability gaps and requirements."[162]

The civilian RCCs mentioned in the SAR agreement are Joint Rescue Coordination Center Juneau (JRCC Juneau) and Aviation Rescue Coordination Center Elmendorf (ARCC Elmendorf).

[161] Although the UCP itself is a classified document, the information required for this section of the thesis is revealed in the (UNCLASS) CRS report, "The Unified Command Plan and Combatant Commands: Background and Issues for Congress," January 3, 2013.

[162] The United States Department of Defense, "Arctic Strategy," November 2013, 8, http://www.defense.gov/pubs/2013_Arctic_Strategy.pdf.

Figure 13. U.S. geographical realignment after the UCP 2011.[163]

a. Northern Command/NORAD

Established in 2002, as the newest COCOM, "USNORTHCOM's mission, as part of the geographical realignment after the Unified Command Plan (UCP) 2011 is to conduct homeland defense, civil support, and security cooperation to defend and secure the United States and its interests…. USNORTHCOM's area of operation encompasses the continental United States, Alaska, Canada, Mexico and the surrounding water out to approximately 500 nautical miles."[164] Although this does not suggest the North Pole is included, Figure 14 shows how the Arctic region is now divided between NORTHCOM and EUCOM.

163 U.S. Department of Defense, "Unified Command Plan," April 27, 2011, http://www.defense.gov/home/features/2009/0109_unifiedcommand/.

164 Andrew Feickert, *The Unified Command Plan and Combatant Commands: Backgrounds and Issues for Congress* (CRS Report No. R42077) (Washington, DC: Congressional Research Service, January 3, 2013), 42, http://fas.org/sgp/crs/natsec/R42077.pdf.

Figure 14. Arctic region split between NORTHCOM and EUCOM.[165]

Because of the growing geo-strategic importance of the Arctic, CDRUSNORTHCOM has designated the Arctic as a key focus area. Along these lines, NORTHCOM is currently examining how to support other U.S. government agencies in the region with SAR assets, humanitarian assistance (HA), disaster relief (DR), and law enforcement. As part of this examination NORTHCOM has identified deficiencies in all-domain awareness, communications, infrastructure, mobility, SAR, enabling capabilities, Arctic Ocean charting, and the ability to observe and forecast Arctic environmental change.[166]

In response to the recognized force gap pertaining to the Arctic region, Joint Task Force Alaska (JTF-AK) was formed in 2002 as a subordinate command of NORTHCOM. Their role is to work with local Alaskan civil authorities for crisis response and evacuation. JTF-AK has the capability of executing the full spectrum of DOD defense capabilities in order to protect U.S. national interests.[167] By virtue of its relatively small size as a DOD Joint Task Force, JTF-AK is very dependent on the provisions of the

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165 U.S. Department of Defense, "Unified Command Plan," April 27, 2011, http://www.defense.gov/home/features/2009/0109_unifiedcommand/.

166 Feickert, *The Unified Command Plan and Combatant Commands: Backgrounds and Issues for Congres*s, 42.

167 U.S. NORTHCOM, "Fact Sheet: Joint Task Force Alaska" states, "Within its JOA, JTF-AK plans and, if directed, integrates the full spectrum of DOD homeland defense efforts and provides defense support to a primary agency, such as the Federal Emergency Management Agency. Prevention, crisis response and consequence management are capabilities included within the spectrum of support," http://www.northcom.mil/Newsroom/FactSheets/ArticleView/tabid/3999/Article/1893/joint-task-force-alaska.aspx.

Alaskan Command (ALCOM) infrastructure, which is part of PACOM, as well as the contributing efforts of the Canadians and Norwegians for Arctic response. As the political and physical environment continues to change in the Arctic, so might the need for the organizations responsible for the region.

At the end of 2012, U.S. Special Operations Command North (SOCNORTH) was established. SOCNORTH is a subordinate unified command of SOCOM under the Operational Control of NORTHCOM whose most prominent strategic objectives include the following.

- SOCNORTH provides NORTHCOM with access to the global special operations intelligence network to support NORTHCOM's defense in-depth concept. This to identify and engage enemy threats prior to entering the homeland.
- SOCNORTH is the lead component for NORTHCOM's support to CT and CP/WMD activities.[168]

NORAD is collocated with NORTHCOM, and as described previously, a bi-national U.S. and Canadian command. By virtue of the command's forward presence and operational posture in Alaska and Canada, NORAD will continue to play a significant role in DOD's ability to meet national security challenges in the Arctic. NORAD also embodies the unique and enduring partnership between the United States and Canada in defense cooperation—a partnership that will prove vital in the Arctic.[169]

b. European Command

EUCOM has traditionally been the single combatant command dealing with the Arctic region. This changed with the establishment of NORTHCOM and the publication of the 2011 UCP.[170] Although NORTHCOM is the leading COCOM for the Arctic Region, with six of the eight Arctic nations in EUCOM's AOR, EUCOM is still very

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168 U.S. NORTHCOM, "Fact Sheet, U.S. Special Operations Command North," http://www.northcom.mil/Newsroom/FactSheets/ArticleView/tabid/3999/Article/1900/us-special-operations-command-north-provisional-command.aspx.

169 U.S. Department of Defense, "Report to Congress on Arctic Operations and the Northwest Passage," May 2011, 15, http://www.defense.gov/pubs/pdfs/Tab_A_Arctic_Report_Public.pdf.

170 U.S. Department of Defense News Release, "DOD Releases Unified Command Plan 2011," April 8, 2011.

much involved in coordinating Arctic security issues. To coordinate these issues with the different Arctic nations and stakeholders, EUCOM even has an Arctic Strategy Branch.

In close cooperation with the Norwegian Ministry of Defense, EUCOM is the co-sponsor of the Arctic Security Forces Roundtable (ASFR). This Arctic security forum, consisting of high-ranking military officers from the eight members of the Arctic Council, plus France, Germany, the Netherlands, and the UK, is one of the very few forums on the Arctic dealing with security issues. Held in June 2011, their first meeting addressed a range of concerns, including infrastructure, the environment, joint exercises and training, and marine domain awareness. In August 2012, the ASFR was focused mainly on how to improve the communications infrastructure in the high north.[171] In 2013, the conference was held in Finland and focused on increased shipping traffic because of the ice melt.[172]

U.S. Special Operations Command Europe (SOCEUR) is EUCOM's TSOC, and is responsible for SOF readiness, targeting, exercises, plans, joint and combined training, NATO/partnership activities, and execution of CT, peacetime, and contingency operations.[173] The SOF units under SOCEUR, permanently based in Germany, had extensive experience in operating in the Arctic environment; however, due to commitments in other geographical areas, this experience has diminished over the years.

c. Pacific Command

With the creation of NORTHCOM in 2002, and the UCP in 2011, PACOM's AOR changed and eventually PACOM's territory in the Arctic region (with the exception of part of the Bering Sea and the Sea of Okhotsk) and Alaska were assigned to NORTHCOM's AOR. However, all Alaskan Forces (with the exception of the Alaskan

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171 "Arctic Nations Meet to Discuss Communication, Maritime Domain Awareness Strategy," EUCOM website, August 30, 2012, http://www.eucom.mil/blog-post/24109/arctic-nations-meet-to-discuss-communication-maritime-domain-awareness-strategy.

172 "Arctic Security Forces Round Table: A New Way to Live by an Old Code," EUCOM website, September 9, 2013, http://www.eucom.mil/blog-post/25348/arctic-security-forces-round-table-a-new-way-to-live-by-an-old-code.

173 U.S. Special Operation Command Europe (SOCEUR), "Our Mission," www.soceur.eucom.mil/pages/home.aspx.

NORAD at JBER and the Missile Defense Agency and Aerospace Command at Fort Greely, who fall under STRATCOM),[174] remained assigned to PACOM in the Forces for Unified Commands Memorandum.[175] Contrary to its geographic proximity to the Arctic, ALCOM is a Subordinate Unified Command of PACOM,[176] and focuses most of its operational efforts to the Pacific and East Asian regions. Strangely, the ALCOM is not mentioned in the CRS report as one of the subcomponents of PACOM.

Any crisis or military intervention in the Arctic region would be heavily dependent on the infrastructure and capabilities of the ALCOM units. As ALCOM are physically located in Alaska within the NORTHCOM AOR, a realignment of command relationship between NORTHCOM and PACOM may be necessary for NORTHCOM to respond to an event in the Arctic region. As the C2 structure of the geographic COCOM currently stands, NORTHCOM does not have a force provider to fill any troop requirements toward the Arctic. As the NORTHCOM Commander, General Jacoby described,[177] "The C2 function that is traditionally carried out by military forces for a COCOM is carried out for NORTHCOM by the Department of Homeland Security and other domestically based interagency organizations."

d. Special Operations Command

Unlike Combatant Commands, with specific geographic AORs, SOCOM is a functional Combatant Command with global responsibilities.[178] SOCOM is the lead command tasked with synchronizing the planning of global operations against terrorist networks, and can execute global operations when ordered to do so. This could include

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174 "ALCOM is headquartered at Joint Base Elmendorf-Richardson (JBER), Alaska. DOD forces in Alaska include more than 22,000 U.S. Air Force, U.S. Army, U.S. Navy and U.S. Marine Corps personnel, and 4,700 Guardsmen and Reservists." http://www.jber.af.mil/alcom/.

175 Feickert, *The Unified Command Plan and Combatant Commands: Backgrounds and Issues for Congress*, 48.

176 U.S. Pacific Command, "Organization Chart," http://www.pacom.mil/Organization/OrganizationChart.aspx.

177 GEN Jacoby's notes on the NORTHCOM posture statement to the House Armed Service Committee, February 2014, http://www.northcom.mil/Portals/28/Documents/TRANSCRIPT%20-%20HASC%20Posture%20Hearing%2026%20Feb%2014.pdf.

178 Posture statement of Admiral William H. McRaven, USN, Commander United States Special Operations Command, before the 112th Congress Senate Armed Service Committee, March 6, 2012, 2.

the Arctic region. Combat-ready SOF forces will normally deploy under the control of the GCC's TSOC. This worldwide focus requires SOCOM to look at the specifics for every different operating environment in the world. Talking to J5 representatives of the SOCOM, the Arctic region is not high on SOCOM's priority list.[179] However, in the closed-loop diagram made by the SOCOM J5 department, the Arctic problems are addressed. Although there is an increasing importance of the Arctic within the U.S. SOCOM, there is no specific guidance to answer the "so what" for SOF. In the 2014 SOF Commander conference, U.S. Special Ops Commanders stated that future SOF needed two things: ISR in Africa, and communications in the Arctic.[180]

6. Other Security Cooperation Organizations

Apart from coordination, command and control means and resources available to the five Arctic littoral nations, there are other overarching security cooperation organizations who need to focus on security in the Arctic. Because the Arctic council does not deal with security issues in the Arctic, one could argue that there is a security gap to be filled. The ASFR tries to bridge this gap and is an initiative of Norway and the U.S. EUCOM. It focuses on bringing all the relevant military players to the table to discuss security issues pertaining to the Arctic region. From a Western perspective, NATO an obvious and existing military organization to fulfill a role in dealing with security issues in the region. The Nordic Defense Cooperation (NORDEFCO) and the EU are less obvious security organizations, but could have roles to play as well. There is no security organization or forum that constitutes all eight Arctic nations, let alone all the nations with a security interest in the Arctic region.

a. Arctic Security Forces Roundtable

The ASFR has been held since 2011, and is an annual meeting of senior military and Coast Guard leaders from eleven countries designed to further broaden partnerships

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[179] Information retrieved during an interview with Deputy of International Engagement, and the Chief of the Strategy Division (J56), U.S. SOCOM, February 28, 2014.

[180] Paul McLeary, "U.S. Special Ops Commanders: We Need ISR in Africa, Comms in Arctic," Defense News, May 20, 2014, www.defensenews.com.

and cooperative efforts among nations with strategic interests and responsibilities in the Arctic. In 2014, the participants included Canada, Denmark, Finland, France, Germany, Iceland, the Netherlands, Norway, Sweden, United Kingdom, and the United States.[181] The ASFR meeting is a great opportunity for the defense agencies of the participating nations to provide support to civil authorities, to share ideas and collaborate, to talk about lessons learned, and focus on how to work together with the future challenges in the Arctic.[182] This venue is unique in the sense that it is the only forum designed specifically to discuss matters of military response to arctic crises.

b. NATO

During the Cold War, NATO's role in the Arctic region was undisputed. Although NATO's Article 5 has a geographical southern delimitation, it does not have a northern one. Bases in Iceland and Norway were used to coordinate a NATO response to any Warsaw Pact threat against its Northern flank.

Today, NATO's role in the Arctic region is controversial. With four of the Arctic five nations being members of the alliance, one would expect an obvious role in terms of security for NATO in the Arctic region. However, the opposite is true. At the 2008 NATO summit in Bucharest, five guiding principles for NATO activity in the Arctic Circle were outlined: (1) "information and intelligence fusion;" (2) "projecting stability;" (3) "advancing international and regional cooperation;" (4) "supporting consequence management;" and (5) "supporting the protection of critical infrastructure."183 However, in NATO's 2010 Strategic Concept, Arctic security was not included. In fact, the word

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181 Patrick Foughty, U.S. European Command, "United States, Norway co-host 4th annual Arctic Security Forces Roundtable," August 28, 2014, http://www.eucom.mil/media-library/article/26802/us-and-norway-co-host-fourth-annual-arctic-security-forces-roundtable.

182 Major-General Randy Kee, the EUCOM Director of Policy, Strategy, Partnering and Capabilities, Harstad, Norway, August 28, 2014.

183 James Jay Carafano, Ariel Cohen, Sally McNamara and Richard Weitz, "EUCOM Should Lead U.S. Combatant Commands in Defense of National Interests in the Arctic," The Heritage Foundation, March 28, 2011, http://www.heritage.org/research/reports/2011/03/eucom-should-lead-us-combatant-commands-in-defense-of-national-interests-in-the-arctic.

Arctic was not found in the 2010 Strategic Concept or the 2012 Chicago NATO summit declaration.[184]

During a visit of the NATO Secretary General to Norway in 2013, he stated that it is likely that Canadian opposition was the reason for this. As a sovereign nation-state, Canada has a prerogative to determine what role, if any, NATO should have in Canada's Arctic region.[185] In a Q&A session with the NATO Secretary General, Ander Fogh Rasmussen, the Secretary General made clear what NATO's responsibilities in the Arctic region were.

> I'm not suggesting a militarization of activities in the Arctic region. But a number of NATO Allies are bordering the Arctic region or they have territory in the Arctic region. And of course, they would expect that NATO's Article 5 applies to all NATO territories, including a NATO territory in the Arctic region. So seen from that perspective, we also have obligations to make sure that the Arctic region remains a region of peace and stability.[186]

It was expected that at the NATO summit in September 2014, the Arctic region would again be discussed as one of the future priorities for NATO; however, other current events clearly overshadowed this summit, and the Arctic was not mentioned at all.

The strongest supporters of an increased role for NATO in the Arctic are Norway and Denmark. Although the word NATO is carefully avoided in Norway's Arctic strategy, the document explicitly states that the Norwegian government aims at implementing an increased level of military training maneuvers in Northern Norway, together with 'allied counties,' so they can familiarize themselves with the unique conditions and the area.[187] With Russian planes infamously conducting a mock bombing

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184 Luke Coffey, "NATO in the Arctic: Challenges and Opportunities," The Heritage Foundation, June 22, 2012, http://www.heritage.org/research/reports/2012/06/nato-in-the-arctic-challenges-and-opportunities.

185 Ibid.

186 NATO Secretary-General Anders Fogh Rasmussen, "America, Europe and the Pacific" (comments at the Marines' Memorial Club Hotel in San Francisco, July 9, 2014), http://www.nato.int/cps/en/natolive/opinions_111659.htm?selectedLocale=en.

187 Norway Ministry of Foreign Affairs, "The Norwegian Government's High North Strategy," 20.

run on the Norwegian Northern defense command HQ at Bodo in 2008,[188] and recent increases in bomber flight in European Airspace, their sense for collective security is understandable. The biggest and most prominent bi-annual NATO exercise, held on Norwegian soil, is called Cold Response.[189] Another Arctic nation that is likely to be in favor of increased NATO involvement in the Arctic region is Denmark, with both Greenland and the Faroe Islands as part of NATO territory. These territories were of great importance in the NORAD ballistic missile defense network, better known as the Distant Early Warning (DEW) line.

Canada is the least supportive of any NATO involvement in the Arctic.[190] Like Norway, Canada has invested heavily in its Arctic defense and security capabilities. Unlike Norway, the Canadians have made it clear that they do not want NATO involved in the Arctic. Generally speaking, there is a concern inside Canada that non-Arctic NATO countries favor an alliance role in the Arctic because it would afford them influence in an area where they would otherwise have none.[191] So far, the United States has seemed indifferent to NATO's involvement in Arctic. The wars in the Middle East Region are likely to have caused this indifference. With the U.S. drawdown out of Afghanistan, the Russian aggression towards the Ukraine, and the increasing interest of China in the Arctic Region, this indifference towards NATO involvement in the Arctic region is likely to change. The U.S. tried to persuade Canada to be more perceptive towards the NATO involvement in the Arctic.[192] As a direct consequence of the current NATO reluctance towards the Arctic, the NATO Special Operation Forces Headquarters

188 Kraska, *Arctic Security in an Age of Climate Change*, 291.

189 Information on Cold Response 2014, for all participating Forces, http://mil.no/excercises/coldresponse/Documents/Cold_respons_2014_Important%20information%20for%20all%20participating%20forces_engelsk_21.02_LR.pdf.

190 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 60.

191 Coffey, "NATO in the Arctic: Challenges and Opportunities."

192 Robert, W. Murray and Tom Keating, "Containing Russia Should not Mean Bringing NATO to the Arctic," *Globe and Mail*, April 25, 2014, http://www.theglobeandmail.com/globe-debate/containing-russia-should-not-mean-bringing-nato-to-the-arctic/article18208720/.

(NSHQ) recognizes the increasing importance of this region; however, they do not have any resources allocated towards it.[193]

A last relevant point to mention in the context of NATO and security cooperation is the existence of a NATO-Russia Council (NRC). The NRC was founded in 2002, and cooperation was strengthened up to December 2013. However, ever since the start of the crisis in the Ukraine, the level of any cooperation in this forum has been non-existent. The current crisis in the Ukraine will further alienate the relationships between Russia and NATO. Whether the four Arctic littoral states are in favor of any role of NATO in the Arctic, Russia will view any individual or collective military response to Russians military buildup in the Arctic as a "NATO escalation."

c. NORDEFCO

In 2009, Finland, Norway, Denmark, and Sweden established the NORDEFCO arrangement. Despite not having an armed force, Iceland is also a member.[194] The organization is coordination oriented, and not a command structure like NATO. The main focus and purpose of NORDEFCO is "to strengthen the participating nations' national defense, explore common synergies, and facilitate efficient common solutions."[195] With Sweden and Finland not being part of NATO, this organization fulfills an important role in Defense Cooperation in the Scandinavian countries. There are also some noteworthy developments pertaining to the Arctic. Norway, which took over as chair of NORDEFCO in January 2014, has pushed for a new style of Nordic military cooperation that is more specialized and goal-oriented, and has the potential to deliver mission-specific forces.[196] Although NORDEFCO will increase coordination and interoperability between its members, unlike NATO, it has no C2 responsibility whatsoever.

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193 NSHQ Chief of Staff and key staff members during a video teleconference discussion with authors, December 17, 2013.

194 James Kraska and Betsy Baker. "Emerging Arctic Security Challenges," Policy brief, Center for a New American Security, March 2014, www.CNAS.org.

195 NORDEFCO Annual Report 2013, http://www.nordefco.org/NORDEFCO-Annual-Report-2013.

196 Gerard O'Dwyer, "NORDEFCO Projects To Boost Spec Ops Collaboration," Defense News, May 19, 2014, http://www.defensenews.com/article/20140519/DEFREG01/305190027/NORDEFCO-Projects-Boost-Spec-Ops-Collaboration.

B. ROLES AND MISSIONS FOR SOF

It is important to understand that Arctic security, as framed by analysts and governments, goes well beyond a narrow conception of national security limited to conventional military threats.[197] This explains why the requirements for the military to operate in the Arctic often concerns missions on the full spectrum of conflict and often in support of other government agencies (OGAs). Even at the highest end of the spectrum of Arctic missions, it is not always clear if the mission is a military one or a constabulary one belonging to another department.[198]

As described previously, the Arctic political environment has evolved dramatically in recent years. With the high likelihood of future SOF involvement, the question now is whether doctrine has evolved and been maintained. This question becomes even more relevant when looking in the preface of AJP-3 (B) where it states, "The successful execution of military operations requires a clearly understood doctrine."[199] In an alliance perspective it seems equally important to appreciate "the strategic environment is fluid, … it is impossible to predict precisely how challenges will emerge."[200] In fact, this underlines the comment made by U.S. Secretary Gates, "we have an impeccable record of failing to predict anything."[201] Hence, by realizing we cannot predict the future, it seems more critical to prepare for, and shape, the future in order achieve national objectives. It appears valid to take this a step further and claim for a doctrine to be applicable and understood it must be relevant and consistent with the demands placed upon it, to include operations in not just a joint frame, but also in a multinational (NATO) frame. This emphasizes the interoperability issues that might exist between the NATO AJP and U.S. JP doctrine when trying to meet the uncertain challenges of the future.

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197 Gongora, "Scoping Missions and Tasks for CANSOFCOM in the Canadian North," 10.

198 Ibid.

199 North Atlantic Treaty Organization [NATO], "Allied Joint Doctrine" (AJP-3(B)), NATO (Mons, Belgium: March 2011), ix.

200 U.S. Department of Defense, *Joint Publication 3-0* [JP 3-0] (Washington, DC: March 2011), I-2.

201 As cited in Jeremy Gray and Rickey Smith, "A Resource Constrained Environment: A Primer to Thinking about Force Structure Change," *Military Review* 91, no. 6 (2011): 10.

To what degree, within the confines of this study, existing doctrine meets future Arctic challenges, is not yet possible to conclude. By focusing on the applicability, or utility of forces based on AJP-3(B), it seems possible to determine that the conventional land component contribution to missions in the Arctic may be limited, unless discussing large-scale territorial disputes. AJP-3 (B) states, "The impact of physical presence and intimate interaction achieved through proximity of land forces should not be underestimated."[202] While this is not disputed, the effect (of conventional forces) may be counterproductive in a politically sensitive Artic context, effectively rendering conventional forces less suited. It is evident, though the focus of this study is SOF, there are going to be a vast number of conventional missions in the Arctic, likely even a majority. However, as the final excerpt from AJP-3 (B) states "if they [SOF] perform tasks that may be conducted by other alliance forces, they do so to a unique set of conditions and standards."[203] The geophysical study identified prevailing, unique, and adverse conditions, which may result in SOF executing otherwise conventional tasks in the Arctic. The difficulties in employing conventional forces becomes further relevant when considering the "… substantial logistic supply, which normally requires sealift, airlift and ground transportation"[204] required to sustain conventional forces. This is a fact that affects SOF as well as conventional forces, except that SOF typically has a much smaller logistic footprint associated with smaller units. Though SOF have smaller logistic requirements, SOF still need support and resupply. Like conventional forces relying on air or aviation resupply, control of the air (air superiority)[205] is a requirement. While denied access to the airspace above the Arctic seems unlikely and associated with major combat operations (as discussed later), conventional air power would have to provide this support in order to sustain SOF; hence, SOF would rely on a conventional air component.

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202 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for the Conduct of Operations (AJP-3(B)),* section 0135.

203 Ibid., section 0140.

204 Ibid., section 0135.

205 North Atlantic Treaty Organization [NATO], *NATO Glossary of Terms and Definitions (English and French) (AAP-06),* NATO (Brussels, Belgium: March 2013), 2-A-11.

This seems to highlight the joint aspect of Arctic (SOF) operations. A fact that becomes further obvious when discussing AJP-3.5.

NATO[206] and U.S.[207] SOF are inherently joint organizations. This is important to keep in mind as it dictates the need to focus on the entire palette of military (SOF) capabilities, and not just one service. Therefore, JP 3–0 states, "SOF are most effective when SO are fully integrated into the overall plan and the execution of SO is through proper SOF C2 elements in a supporting or supported relationship with conventional forces" and supports this.[208] SOF are strategic assets and "special operations are normally conducted in uncertain, hostile, or politically sensitive environments to achieve military objectives that can have military, diplomatic, informational, or economic effects. These operations often require covert, discreet, or low prominence capabilities."[209] The previous excerpt from AJP-3.5 effectively describes how SOF operations impact the four elements of national power (DIME),[210] and implicitly describes how to use military (SOF) to obtain national interests in a hostile, uncertain environment with great political sensitivity. These are all traits that exist in the Arctic geopolitical environment. AJP-3.5 continues to define

> Special operations and how they differ from conventional operations in degree of physical and political risk, operational techniques, mode of employment, independence from friendly support…. [Furthermore,] the successful conduct of special operations relies on individual and small unit proficiency in a multitude of specialized, often nonconventional operational skills applied with adaptability, improvisation, innovation, and [most important in an Arctic environment] self-reliance…. These responses may not entail the risk of [crisis] escalation normally associated

206 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* NATO Special Coordination Centre [NSCC] (Mons, Belgium: NSHQ, January 2009), 1-1.

207 U.S. Department of Defense, *Joint Publication 3-05, Special Operations* (Washington, DC: April 2011), II-2.

208 U.S. Department of Defense 3-0, *Joint Operations*, V-49.

209 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5)*, 1-1.

210 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine (AJP 01(D)),* NATO (Brussels, Belgium, December 2010), vii.

with employment of inherently larger or more visible conventional forces.[211]

The previous excerpts from AJP-3.5 are in congruence with JP 3–5, thus the fundamental view of SOF between alliance and U.S. doctrine is consistent.[212]

1. SOF Characteristics

SOF operations span the spectrum of conflict from peacetime to war. AJP-3.5 outlines the common attributes of five special operations: tempo, pre-emption, disruption, deception, and initiative. Across the spectrum of conflict, the following "common attributes" are essential to highlight. First, tempo enables a "rapid execution … [in order to] mass combat power at the critical place and time, accomplish the mission, [and] withdraw before the adversary can react…."[213] Combat power should not merely be viewed as firepower, but rather as the joint tactical ability to efficiently reach mission objectives. Second, AJP-3.5 also describes how "SOF pre-empt an adversary by neutralizing capabilities before a fight. [Third,] to gain the initiative, SOF encourage, an ability and willingness to make independent, time-critical decisions using all available information and guidance…."[214] It seems that to achieve and maintain these three special operations common attributes (tempo, pre-emption, and initiative) a high degree of force preparedness is required. This is further evident in the following: "the numbers of SOF are limited and cannot rapidly expand,"[215] and when studying the section on SOF principles of employment, it states that the key to success lies with the [capabilities and understanding of the] individual special operator.[216] It is imperative to consider the entire capability when discussing SOF preparedness, and to include intelligence access, mission planners, mobility assets, and political mandate. To gain an understanding of these

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211 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* 1-1, 1-2.

212 U.S. Department Of Defense, *Joint Publication 3-05, Special Operations*, I-1 and I-2.

213 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5)*, 1-3.

214 Ibid.

215 Ibid., 0105.a.

216 Ibid., 0105.

aspects, further elaboration on what SOF is and how to utilize the SOF will be discussed in the following sections.

Because SOF is defined as a unique capability, they can provide what conventional air, land, and maritime forces cannot.[217] While this may seem obvious, it is highlighted by the previous discussion on SOF ability to operate in an environment of political sensitivity that requires covert or discrete presence. In a study from 2007, Robert Spulak discusses the definition of SOF and what it is that makes SOF unique. Spulak points out that this "conventional" definition of SOF is "only relative to what is conventional."[218] Spulak argues that the uniqueness of SOF is found in the very nature of war—with connotations tracing back to Clausewitz—where "everything is simple, but the simplest thing is difficult."[219] Spulak "explains how the qualities of SOF directly address the origins of friction,"[220] and states, in its simplest form, friction can be said to be "the difference between plans and reality."[221] "Therefore, friction is the reality that will continue to help determine the requirements and the limitations of military forces, due to the enduring nature of war …."[222] Spulak uses this understanding of the *enduring* nature of war and its impact on doctrine to derive three fundamental attributes of SOF, which sets SOF apart from other "narrowly defined military organizations."[223] These attributes are elite warriors, creative, and flexible.[224]

> The uniqueness and qualities of SOF warriors are almost universally recognized. SOF are specially recruited, assessed, selected, trained, and equipped; have access to national-level intelligence and cutting-edge technology; and demonstrate boldness, intellect, and perseverance.[225]

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217 Ibid., section 0201.

218 Robert G. Spulak, Jr., *A Theory of Special Operations: The Origin, Qualities, and Use of SOF*. No. JSOU-R-07-7 (Albuquerque, NM: Sandia National Labs, 2007), 1.

219 Ibid., 6.

220 Ibid., 5.

221 Ibid., 6.

222 Ibid., 10.

223 Ibid., 14.

224 Ibid., 14.

225 Ibid., 16.

This is what Spulak concludes makes SOF *elite warriors*. "Creativity means the ability to immediately change the combat process, altering the way in which the *tension* is accommodated between threatening or performing destruction and avoiding it."[226] Tension is the dynamic and conflicting balancing of attempting to destroy the enemy while securing own survival at the same time.[227]

> Ironically, *flexibility* means that a small SOF unit can have a much larger range of capabilities than even a large conventional unit as a result of the smaller range of more capable personnel … the lack of numbers is also why SOF, in general, cannot win the war by themselves…. The range of capabilities does, however, make SOF more independent of other military forces in their operations.[228]

What seems to be a common denominator in how Spulak defines the unique SOF attributes are personnel skills. These skills enable SOF to cope with a higher degree of uncertainty than its conventional counterparts.

The doctrinal discussion of SOF versus conventional forces also entails both increased ability, but also limitations in the application of SOF. AJP-3.5 lists four criteria to consider when "evaluating SOF employment:"[229] appropriate, feasible, sustainable, and justifiable. Appropriate involves consideration toward whether the mission is a SOF mission. Is SOF the most efficient asset? Do other means exist that would be able to conduct the mission better, maybe even at a lower risk level? If so, it is not a SOF mission. The caution about appropriateness is further augmented in AJP-3.5 where it states, "There are limitations to SOF. Improper use of SOF can rapidly lead to the depletion of SOF capabilities. SOF cannot be easily replaced, nor can their capabilities be rapidly expanded."[230] This is almost verbatim supporting JP 3–05.[231] While the difficulties in replacing SOF assets have operational relevance when assessing feasibility,

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226 Ibid., 17.

227 Ibid., 10.

228 Ibid., 19.

229 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* sect. 0106.

230 Ibid., section 0502.

231 U.S. Department of Defense, Joint Publication 3-05, Special Operations, II-3.

the inherent difficulties in rapidly expanding SOF have strategic implications when enforcing structuring and preparedness. "SOF, therefore, should primarily be employed for critical or decisive objectives,"[232] and "no mission should be declared feasible or unfeasible based solely on the time available to plan and prepare for the mission."[233] Rather, "does the SOF element have the appropriate training, skills, planning, and rehearsal time, as well as the required cultural understanding."[234] This highlights the fact that SOF is not simply SOF, but SOF missions in any particular environment likely require specific preparations and qualifications. This is explicitly stated in JP 3–05, "Selected SOF are regionally, culturally, and linguistically oriented for employment; extensive language and cross-cultural training are a routine part of their development."[235]

The aspects of preparation do not just pertain to the specific SOF asset, but also to sustainability, the third mission criteria. "Even if the target is appropriate, feasible, and vulnerable to SOF, a lack of dedicated support resources may prevent the execution of a special operation."[236] Though the wording is different, the AJP 3.5 sustainability criterion corresponds to the fourth JP 3–05 criteria, which discusses insufficient support resources invalidating the feasibility of employing SOF.[237] Once again, the lack of infrastructure and vast distances in combination with adverse Arctic weather conditions might pose logistic restrictions in the size and application of a military force. This is captured in JP 3–05, which states "Most SO missions require non-SOF support. SOF are typically not structured with robust means of logistic sustainment capabilities."[238]

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232 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0502.

233 Ibid., section 0504.

234 Ibid., section 0106.b.

235 U.S. Department of Defense, Joint Publication 3-05, Special Operations, II-2.

236 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0106.c.

237 Although the wording is different, the NATO sustainability criteria in effect corresponds to the fourth JP 3-05 criteria, which discusses insufficient support resources invalidating the feasibility of employing SOF.

238 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, II-3.

Finally, the fourth AJP 3.5 criteria is, "does the expected outcome justify the risk?"[239] While this criterion should be applied to any application of military force, it is even more important when considering the characteristics of SOF and the geophysical environment, as well as the sensitive geopolitical environment in the Arctic. The overall criteria for employment of SOF are similar between the NATO and U.S. doctrine. However, the U.S. JP 3–05 does employ a fifth criterion, stating, "The mission or activities [of SOF] should support the JFC's campaign or operation plan, or special activities. If not, shortfall in SOF capabilities should be pointed out and appropriate SOF missions recommended."[240] This fifth U.S. criterion appears as a very important element in identifying and tasking SOF missions and the fact that SOF is a joint commitment, and should be integrated into the overall plan, as addressed earlier, to achieve unity of effort. This could be an indication of a stronger link between the joint operations doctrine and SOF doctrine in U.S. doctrine compared to NATO doctrine.

2. SOF Principal Tasks

NATO SOF conducts three principal tasks: Special Reconnaissance and Surveillance (SR&S), Direct Action (DA), and Military Assistance. Under these principal tasks,

> SOF offers the Alliance [NATO] an additional and unique capability to achieve military objectives and perform tasks the no other forces in NATO are able to conduct while creating strategic effects. If, however, they [SOF] perform tasks that may be conducted by other Alliance forces, they do so to a unique set of conditions and standards.[241]

From the preceding paragraph, it seems safe to conclude that SOF may conduct conventional missions if conditions and standards warrant the use of SOF. This seems to be an important indicator to what extent the operational and geophysical environments

239 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0106.d.

240 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, II-4.

241 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0201.

may suggest the use of SOF in certain otherwise conventional scenarios. Currently, NATO SOF conducts the following three principal, or "core tasks."

- Special Reconnaissance and Surveillance (SR&S). This is a predominately human intelligence (HUMINT) function that places required "eyes on target" in hostile, denied, or politically sensitive territory.[242]
- Direct Action (DA). These are precise operations, focused on specific, well-defined targets of strategic and operational significance, normally limited in scope and duration.[243]
- Military Assistance (MA). This is a broad spectrum of measures in support of friendly forces throughout the spectrum of conflict.[244]

Apart from these three principal tasks, NATO distinguishes Additional Activities of SOF, which consist of Counter-Irregular Threat Activities like terrorism (CT) and insurgency (COIN), Countering Chemical, Biological, Radiological, and Nuclear Weapons (CBRN), Hostage Release Operations (HRO), and Faction Liaison.[245]

Although the overall mission set between NATO and U.S. SOF is similar, there do exist several differences, especially in how the different missions are defined (missions, tasks, core activities, and additional activities). JP 3–05 specifies the following core SOF activities: DA, SR, counter proliferation of WMD, unconventional warfare (UW), Foreign Internal Defense (FID), Security Force Assistance (SFA), COIN, Information operations, Military information support operations, and civil affairs operations.[246] U.S. SOF is directly tied to U.S. national interests, whereas NATO SOF must fit a broader scope in support of not just national military strategy, but in support of overall alliance security strategy. This is bound to result in a compromise, reflecting the security threats to the alliance, and not necessarily the threat as perceived by each individual nation. Hence, it is important to recognize that the difference in doctrinal

242 Ibid., section 0202.a.

243 Ibid.

244 Ibid., section 0202.b.

245 Ibid., section 0203.b, c & d.

246 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, II-6.

application of SOF may affect how the forces mesh in multinational and alliance frameworks, with possible complications in organizational differences and C2 structure.

The discussion of how SOF roles and missions are articulated is influenced by the demand for SOF. When the demand for SOF is high, military leaders are more selective about how they define roles and missions. When demand for SOF declines, roles and missions are defined more broadly.[247] As an example, at times of high demand for SOF, missions like Humanitarian Assistance and Combat Search and Rescue (CSAR) have been undervalued. Another important discussion is the use of SOF in an interagency setting, to conduct domestic operations. There are many differences among the NATO countries on this issue. Special operations missions vary from small unilateral actions to large-scale activities of a combined and joint nature. Where JP 3–05 states, "SO can be conducted across the range of military operations at all levels of war and throughout all phases of a campaign or operations,"[248] JP 3–05 briefly states the following:

> Military operations, to include SO, vary in scope, purpose, and combat intensity … with a range of military operations from recurring military engagement security cooperation, and deterrence activities (typically no conflict to low intensity conflict), to crisis response and limited contingency operations (low to high), and if necessary, to major operations and campaigns (high intensity).[249]

3. Spectrum of Conflict

Whereas AJP 3.5 states it more eloquently, SOF executes the principal tasks across the spectrum of conflict.[250] The spectrum of conflict is generally a scale between low and high intensity conflict, or runs from peacetime to war. AJP 3–5 distinguishes between four levels of conflict: (1) Peacetime Military Engagements; (2) Peace Support Operations; (3) Counter Irregular Threat Operations; and (4) Major Combat Operations. As mentioned before, the requirements for the military—and SOF in particular—to

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247 David Tucker and Christopher J. Lamb, *United States Special Operation Forces* (New York: Colombia University Press, 2007), 165.

248 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, I-4.

249 Ibid., I-3.

250 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5)*, 1–2.

operate in the Arctic often concerns missions on the full spectrum of conflict and often in support of OGAs.

a. Peacetime Military Engagement

The main purposes of SOF would be the early identification and assessment of a potential crisis, training of friendly forces, and developing a military liaison.[251] Translated by the Arctic, the emphasis for SOF in this spectrum could be military liaison with other SOF units, including Russian, through joint training and exercises. Not only military units should be engaged, but equally important, the indigenous and local population of the Arctic region. The local population can be extremely valuable as "eyes and ears" in the region. Through presence, cooperation, and a focus on interagency operations fighting against future criminal networks in the Arctic, the ability to identify potential conflict will increase Additionally, the SOF must be prepared to support SAR operations, contribute to HA operations, and conduct MCT operations and HRO.

b. Peace Support Operations

Depending upon the context and the possibilities within given rules of engagements, SOF can contribute with all of its principal tasks (SR&S, DA, and MA).[252] In an Arctic environment, the emphasis for SOF in this spectrum of conflict will probably be the ability to contribute significantly to intelligence requirements. This is possible either directly or indirectly, through cooperation with indigenous populations, as well as through its ability to conduct MCT, HRO, and CSAR.

c. Counter Irregular Threat Operations

When preparing for counter-irregular threat operations, SOF can provide area assessment and early command, control, and communications (C3) capabilities.[253] By virtue of its very nature, an irregular threat will usually involve SOF. Although the chance of COIN in the Arctic is arguably low, CT in the Arctic could become real. SOF

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[251] Ibid., 1–2.

[252] Ibid., 1–2.

[253] Ibid., 1–2.

can utilize all its core tasks plus additional activities in this spectrum of conflict. However, the emphasis will be on direct missions.[254]

d. Major Combat Operations

During major combat missions, SOF would concentrate on the principle tasks of SR&S and DA.[255] In an Arctic context, SOF would be best utilized in contributing to the intelligence requirements, and its capability to conduct surgical strikes under extreme conditions. The ability to verify and assess intelligence on the ground using SOF operators instead of hardware has proven to be demanding but highly valuable. Furthermore, satellite coverage above 70-degree North latitude seems to be limited, creating problems for ISR platforms to operate. Examples of likely DA missions for SOF are sabotage missions on crucial C2 nodes, strategic military installations, and other high value targets. Key here is the ability to operate effectively in the hostile Arctic environment. Table 1 lays out Arctic SOF missions on the spectrum of conflict.

Table 1. Possible future SOF missions in the Arctic on the spectrum of conflict.

<table>
<tr><td colspan="4">Highly likely</td><td colspan="4">Less likely</td></tr>
<tr><td>Interagency Operations</td><td>Additional Activities
HRO
Liaison
(M)CT
SAR
HA</td><td>SR&S</td><td>Additional Activities
HRO
Liaison
(M)CT
(C)SAR</td><td>SR&S
DA
MA</td><td>Additional Activities
HRO
(M)CT
(C)SAR</td><td>SR&S
DA</td><td>Additional Activities
HRO
(M)CT
(C)SAR</td></tr>
<tr><td colspan="2">Peacetime Military Engagement</td><td colspan="2">Peace Support Operations</td><td colspan="2">Counter Irregular Threat Operations</td><td colspan="2">Major Combat Operations</td></tr>
<tr><td colspan="4">Low intensity</td><td colspan="4">High Intensity</td></tr>
</table>

By combining the roles and missions from AJP-3.5 with the spectrum of conflict as discussed it is possible to show future SOF missions in the Arctic. These missions can be executed in an independent or supporting role. Because of the geophysical properties

254 For an explanation between direct and indirect SOF missions, see Table 5.1 in Tucker and Lamb, *United States Special Operation Forces*, 153.

255 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5)*, 1–3.

in the Arctic, it is expected that most SOF missions in the Arctic, will be executed in the maritime domain.

The strategic value of SOF operating in the Arctic lies in the ability to effectively operate in an extremely difficult and demanding environment, where conditions may preclude the use of conventional units, ISR platforms and precision-guided ammunitions (PGM) may not be as reliable and efficient as in lower latitudes. Instead, the individual operator skills and distinct SOF characteristics can be used to play a significant role in achieving mission success.

4. Special Air Operations and Special Maritime Operations

As previously discussed, SOF is inherently joint. This jointness goes beyond using enablers such as conventional support units. Within the SOF community, jointness is an inherent element of unit structure, mission planning and execution. Along with an increased need for strategic guidance, jointness may be one of the reasons why Denmark is establishing a joint Special Operations Command along the lines of USSOCOM.

To capture SOF jointness, the following will discuss Special Air Operations (SAO) and Special Maritime Operations. Tempo was previously discussed as a critical attribute in SOF missions.[256] While tempo is more than mere speed, tempo is also the ability to rapidly execute missions.[257] Mode of employment affects how SOF achieves rapid employment. As maritime domain with vast distances and limited infrastructure, the Arctic requires the use of a combination of air and maritime SOF elements to enable timely deployment of SOF. Two elements lie behind this statement: range and response time. The use of ships as a means of employment usually satisfies the range requirement; however, depending upon the mission, response time to a certain task may not be satisfied if solely utilizing maritime surface-based capabilities. Typically, a combination of air and maritime capabilities are needed; therefore, it is necessary to include air and maritime SOF in the discussion.

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[256] North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0104 a.

[257] Ibid.

> Special Air Operations are activities conducted by specially organized, trained, and equipped air and aviation [fixed and rotary wing] forces to support military strategic or operational objectives by unconventional military means in hostile, denied, or political sensitive areas … across the full spectrum of conflict.[258]

> SAO support each of the NATO SOF tasks as previously discussed.[259]

> The primary special air operation is air infiltration/extraction and resupply via fixed-wing and rotary-wing aircraft. Other special air activities include close air support (CAS), ISTAR, air-to-air refueling (AAR), and PR, including MEDEVAC, for special operations air, ground, and maritime forces.[260]

Infiltration and extraction are precisely where the Arctic may introduce certain requirements, and to highlight the fact that just like ground SOF, SOA by default is not suited to Arctic operations. Because of the geophysical conditions in the Arctic, specific and significant capabilities are required to operate in the Arctic. As previously discussed, this requires a high degree of preparedness. AJP-3.5 mentions the possible role of non-special operations aircraft in support of SOF missions "… to augment the airlift, fire support, and ISTAR capabilities."[261] While Denmark employs non-special operations aircraft in the Arctic to conduct resupply, the aircrews performing these tasks are specifically trained to such a high level that they compare to SOA.[262] This only serves to highlight the need for specifically-trained SOA capabilities for Arctic operations.

> Maritime SOF primarily conduct operations in the coastal, riverine, and maritime environments. They utilize small, flexible, mobile units operating under, on, and from the sea.[263]

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258 Ibid., section 0204 a. (1).

259 Ibid., section 0204 a. (1)(a).

260 Ibid.

261 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0204 a. (1)(b).

262 Forsvarskommandoen (Defense Command, Denmark), "Vaernsfaelles Specialoperations styrker," [Joint Special Operation Forces] (Copenhagen: March 2014), 9.

263 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5),* section 0204 b. (1).

It seems obvious that maritime SOF are affected at least to the same degree as ground and air SOF, simply because of their domain. The coast and sea are severely affected by the geophysical conditions in the Arctic. The ability to operate under the sea might be non-existent, significantly reduced, or require substantial training and equipment adaptation. To gain full advantage of maritime SOF, the focus from littoral and riverine domains[264] may have to be shifted toward Arctic conditions—specifically operating in remote areas on, among, and under the sea ice—to conduct an otherwise pertinent mission set, including the following:[265]

- Coastal reconnaissance.
- Covert beach reconnaissance in advance of amphibious assault.
- Covert assault route preparation in advance of amphibious assault.
- Recovery or protection of ships and oil installations subject to hostile or non-state (terrorist) action.
- Maritime CT.
- Support to civil authorities.

C. DEFINING ARCTIC SOF CAPABILITIES

This section of the study is dedicated to the analysis of each of the three countries represented by the thesis authors. This analysis is not comparative, as each country is different in size, location, and interest relative to the Arctic. Furthermore, each of the countries has different constitutional rules, resulting in different conditions for the employment of SOF. However, the analysis conducted applied the same aspects of analysis to each of the countries by way of a universally recognized method. The method can be easily replicated for other countries of similar relationship or size as the ones captured in this study.

264 Ibid., section 0204 b. (4).

265 Ibid.

1. Current Arctic SOF Capabilities

Several documents and articles have been written in recent years assessing the military Arctic capabilities of the Arctic Five, and providing an overview of unclassified military and essential civilian hardware (like nuclear powered icebreakers). These documents have attempted to prove the point that a significant capability gap exists for a particular country. A U.S. GAO report from January 2012 states, "DOD has identified Arctic capability gaps, but lacks a comprehensive approach to addressing Arctic capabilities."[266] The working group, consisting of DOD and Directorate of Homeland Security, was established to focus on four primary capability areas.[267] This report concludes with "addressing near-term gaps is essential for DOD to have the key enabling capabilities it needs to communicate, navigate, and maintain awareness of activity in the region.[268] In this thesis, capability refers to, "the ability to achieve an objective in a military operation."[269] Not much seems to have been done for the United States since this report appeared. The few documents that describe Arctic capabilities argue that there is an increased requirement and a lack of capabilities or ambition to address this objective.

2. Explaining DOTMLPFI

DOTMLPFI stands for doctrine, organization, training, materiel, leadership and education, personnel, facilities, and interoperability. The DOTMLPFI method of analysis is a NATO-recognized method for measuring military capability. This method of analysis is also used extensively by the U.S. DOD, and is governed by the Chairman of the Joint

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266 John H. Pendleton, Suzanne Wren, Susan Ditto, Nicole Harms, Timothy Persons, Steven Putansu, Frank Rusco, Jodie Sandel, Amie Steele, and Esther Toledo, *Arctic Capabilities: DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near-and Long-term Needs* (GAO-12-180) (Washington, DC: U.S. Government Accountability Office, January 2012), 12.

267 The working group was directed by its Terms of Reference to focus on four primary capability areas when identifying potential collaborative efforts to enhance Arctic capabilities, including near term investments. Those capability areas include maritime domain awareness, communications, infrastructure, and presence.

268 Pendleton et al., Arctic Capabilities*: DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near-and Long-term Needs*, 17.

269 United States Joint Chiefs of Staff J-8, *Capabilities-Based Assessment (CBA) User's Guide*, version 3, 7.

Chiefs of Staff 3170.01H (2012).[270] CJSCI 3170.01H defines capability as "the ability to execute a specified course of action. A capability may or may not be accompanied by an intention." To assess relevant military Arctic SOF capabilities of the Dutch, Danish, and U.S., independent capability-based assessments (CBA) of each must be conducted. DOTMLPF is a fundamental part of a CBA when the goal is requires more than a materiel solution. Since the focus of this analysis is not simply a materiel solution, but also analyzes current capabilities through scenario-based assessments, the DOTMLPF method would be best to describe the respective military's overall arctic capabilities.[271] Interoperability of the allied operation is inherently important, and the same is true when responding to scenarios in the Arctic.[272] Therefore, an "I" is added to the acronym, making it DOTMLPFI.[273] This is further explained in CJCSI 3010.02D (2013),[274] and

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270 Chairman of the Joint Chiefs of Staff, "Joint Capabilities Integration and Development System," http://www.dtic.mil/cjcs_directives/cdata/unlimit/3170_01.pdf.

271 Department of the Army, "TRADOC Regulation 71-20, Force Development: Concept Development, Capabilities Determination, and Capabilities Integration," 2013, 57, http://www.tradoc.army.mil/tpubs/regs/tr71-20.pdf.

272 NATO, "Backgrounder: Interoperability for Joint Operations," 2006, http://www.nato.int/nato_static/assets/pdf/pdf_publications/20120116_interoperability-en.pdf.

273 **Doctrine-** Joint doctrine consists of fundamental principles that guide the employment of US military forces in coordinated action toward a common objective; reflects best practices based on extant capabilities (i.e. Current force structures and field equipment).

Organization- Describes the way in which the Joint Force organizes to accomplish missions, execute functions, and deliver, support or sustain joint war fighting capabilities.

Training- Through training exercises based on approved joint doctrine, new concepts can be combined and observed, providing a capability response to analyzed trends, best practices, and insights derived from military commanders across the full range of joint functions and mission sets.

Materiel- Joint concepts describe materiel and nonmaterial capabilities required to improve the ability of the Joint Force to overcome future challenges. Once a capability is identified, a risk analysis is applied. Capability gaps are analyzed and under certain risk levels, changes are submitted to defense acquisition programs. Non-material solutions are met by seeking a new capability solution to close identified gaps.

Leadership and Education- Joint learning objectives are articulated and can provide a significant influence over [Joint Professional Military Education]. These objectives can be the result of force research developments or used for the basis of instruction, exercise, or professional military discussion.

Personnel- The personnel component of DOTMLPF-I refers to the individuals required in either a military or civilian capacity to accomplish an assigned mission. Joint concepts espouse new ways of operating or new capabilities that directly affect the individual and collective skills required by their military to accomplish their mission.

Facilities- Key facilities include command installations and industrial facilities to support the military operations or production programs. Joint concepts may impact or rely on a number of facilities, both within and outside of their respective State's boundaries.

NATO publications on interoperability.[275] Figure 15 displays the elements of DOTMLPF(I) and how Interoperability (I) is an inherent part of all the other elements.

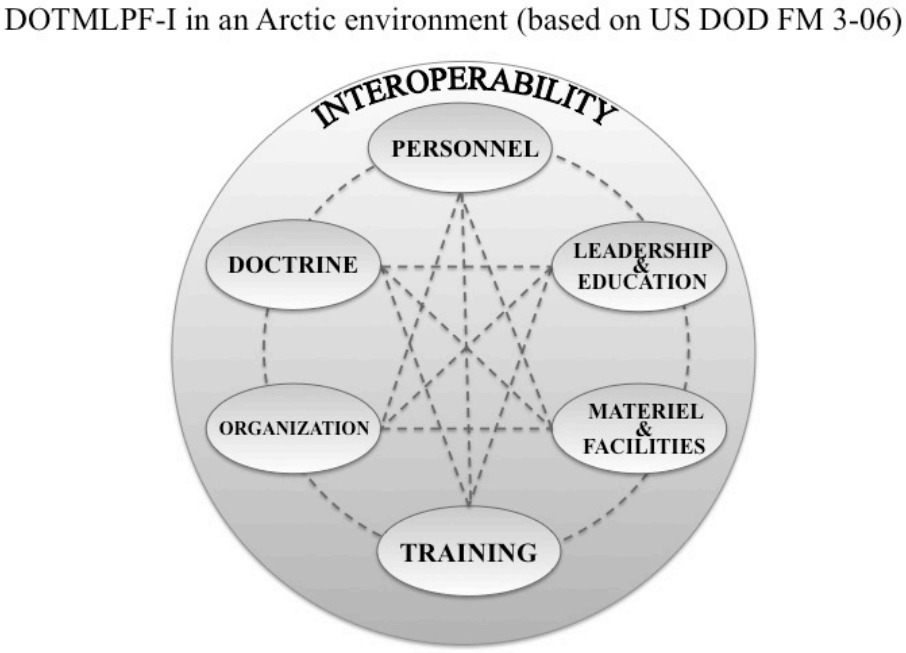

Figure 15. DOTMLPFI in the Arctic.

The outcome of the DOTMLPFI capability analysis is the mutual evolution of a joint force to create or improve a needed capability; in this case, an Arctic capability. The constraints, limitations, and assumptions of capability analysis are also taken into

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Interoperability- NATO describes interoperability as "the ability of different military organizations to conduct joint operations. These organizations can be different nationalities or different armed services (ground, naval, and air forces) or both. Interoperability allows forces, units or systems to operate together. It requires them to share common doctrine and procedures, each other's infrastructure and bases, and to be able to communicate with each other. It reduces duplication in an Alliance […], allows pooling of resources, and even produces synergies among members."

274 Chairman Joint Chiefs Staff, "CJCSI 3010.02D: Guidance for Development and Implementation of Joint Concepts," 2013, http://www.dtic.mil/cjcs_directives/cdata/unlimit/3010_02.pdf.

275 NATO, "Backgrounder: Interoperability for Joint Operations," 1.

consideration, and will affect the overall level of risk that each military's state is willing to assume.[276]

3. Danish SOF Arctic Capabilities

Danish SOF consists of the Army SOF, *Jægerkorpset* (JGK), and Navy SOF, *Frømandskorpset* (FKP). The Royal Danish Air Force (RDAF) does not have any designated SOF units. However, the Air Force (along with conventional assets from other services) supports Danish SOF with units, which are specifically designated, trained, and equipped to support SOF missions.[277] The Air Force will get a disproportionate amount of space in this analysis compared to the Navy. The reasons for this are twofold. First, the Danish Navy maintains a constant presence in the Arctic, and the Navy's capability is undisputed, and has been further augmented through implementation of new ships such as the ocean patrol vessels (OPV) of the KNUD-RASMUSSEN class.[278] Second, through discussions with Danish SOF representatives, it was soon obvious that some of the major concern pertaining to operating in the Arctic was strategic and tactical mobility.[279] The Navy is able to provide both in a maritime environment. The suitability of this form of mobility depends upon the specific scenario. While the Air Force also has an Arctic legacy, this capability is less obvious and deserves further attention.

a. Doctrine

The foundation for Danish SOF is NATO SOF doctrine and policy.[280] Although unsuited for this study due to classification, TTPs and unit SOPs do exist. Noteworthy is the fact that Danish SOF does not have or utilize an Arctic-specific doctrine, and the

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276 Department of the Army, "TRADOC Regulation 71-20, Force Development: Concept Development, Capabilities Determination, and Capabilities Integration," 61.

277 Forsvarskommandoen (Defense command, Denmark), "Vaernsfaelles Specialoperations styrker," 9.

278 Danish Ministry of Defence, "Missions in the Arctic and the North Atlantic," Copenhagen, May 13, 2014, http://www.fmn.dk/videnom/Pages/OpgaveriArktisogNordatlanten.aspx.

279 Commander Mogens Christens and Lieutenant-Colonel Claus Wammen, in discussion with the authors, May 18, 2014.

280 Forsvarskommandoen (Defense command, Denmark), "Vaernsfaelles Specialoperations styrker," 11, 16.

TTPs and SOPs are derived from experiences in the European Arctic through years of training in primarily Norway and Sweden.[281] "Doctrinally, the SOF approach remains unchanged until now,"[282] and thus, it may not adequately capture the fact that the Arctic is primarily a maritime domain.[283] The RDAF relies on NATO doctrine like the supported SOF units. Besides this air SOF mission, TTPs are developed in cooperation with Danish SOF units. The Air Force procedures have been aligned with SOF procedures over the past decade. The Air Force is now—from a TTP perspective—capable of supporting SOF from desert and Arctic environments overland to maritime environments.

Although part of this discussion belongs in the training and materials section, the doctrines and procedures are what separate these aircrews from other (conventional) units, and their skills that enable the aircrews to operate in the Arctic. The RDAF C-130 (Hercules) and CL-604 (Challenger) units have operated in the Arctic (Greenland) for decades to include airdrop, TLZ landings on snow and ice, surveillance and reconnaissance in support of SAR, oil-spill detection, and fishery monitoring missions. This capability still exists and is used extensively. The Lynx[284] has also operated on the North Atlantic for decades as an organic part of the Navy. The Lynx unit was only recently transferred from the Navy to the Air Force. This (Arctic) mission is the primary (and dimensioning) mission for the maritime helicopter (MARHELO). The doctrine and TTPs reflect this. The EH-101 and AS-550 units are also capable of operating in Arctic environments; however, like the SOF units, the procedural foundation is based on experience gathered in the Scandinavian Arctic. To what extent these procedures translate to Greenland and beyond is uncertain. Some of the concerns are the procedures, which are used in a mountainous Arctic—where vegetation provide sufficient contrast to safely

281 Commander Mogens Christens and Lieutenant-Colonel Claus Wammen, in discussion with the authors, May 18, 2014.

282 Major Bo Jantzen, in email correspondence with the authors, September 29, 2014.

283 Pendleton, et al., *Arctic Capabilities: DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near-and Long-term Needs*, 7.

284 The LYNX will be replaced by MH-60R by 2016. The MH-60R was specifically meant to augment the Arctic MARHELO capability. Source: Danish Ministry of Defence, "Missions in the Arctic and the North Atlantic."

operate under visual conditions—may prove unsuited and outright dangerous in a maritime Arctic with dominating white-out conditions. These conditions with very limited visual references are usually avoided. This may not be possible in the Arctic. This could be an example where tactical considerations prove a doctrinal concept invalid.

b. Organization

Currently, Danish SOF is undergoing significant organizational changes. Though vastly different in size, these organizational changes are comparable in nature to what the U.S. DOD did when it established U.S. SOCOM. The result of this should enhance the future strategic focus of Danish SOF, jointly organized[285] directly under the defense command. This is interesting viewed in the light of the Danish Prime Minister's opening speech to parliament in 2013, when she explicitly stated there would be an increased Arctic focus, and that Denmark shall be capable of handling the future issues in the Arctic, specifically addressing SAR[286] and environmental protection.[287] The Arctic command is a result of this increased Arctic focus. If Danish SOF are deployed to the Danish Arctic, it will be through command-level coordination between the Arctic command and SOCOM.[288] This top-level Arctic focus may result in an Arctic-specific reorganization where elements from Danish SOF will join with *Beredskabsstyrelsen* (Danish equivalent of the U.S. Federal Emergency Management Agency) and the Air Force to create an Arctic response force to establish an initial emergency response capability.[289]

The JGK and the FKP are both organized—though not quite similarly—into platoons. This short description only serves to illustrate the naturally limited number of

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285 Forsvarskommandoen (Defense Command, Denmark), "Vaernsfaelles Specialoperations styrker," 7.

286 While SAR is not typically an SOF mission, the Danish JGK does consider a SAR mission in the Arctic an SOF mission. Lieutenant-Colonel Claus Wammen, in discussion with authors, May 18, 2014.

287 Danish prime minister's opening speech to parliament (Statsministeriet, Copenhagen: October 2013), http://www.stm.dk/_p_13927.html.

288 Forsvarskommandoen (Defense command, Denmark), "Vaernsfaelles Specialoperations styrker," 35.

289 A study is currently analyzing how to establish an Airborne initial emergency response for "isolated regions." Major Bo Jantzen, in email correspondence with the authors, September 29, 2014.

SOF available to Denmark for Arctic operations. While the number of Danish SOF have affected the missions Danish SOF can contribute to, the Arctic region is vast, and the Danish part of the Arctic greatly exceeds any other national area of operation Danish SOF have ever previously been assigned to. This might prove to be a difficult task—in mere size—in the future. Danish SOF is not regionally aligned like U.S. SOF; however, within the different platoons the operators are specialized in order to sustain a response to recognized contingencies in various regions of the world. The Danish Air Force does not have units organized under SOF. How the integration will occur with the newly established SOCOM, is yet unknown.

c. Training

The JGK has maintained an arctic capability, dating back at least to 1988.[290] The FKP launched their (cold/wet) Arctic training in 1993. "From 1997 forward, the FKP was a consistent participant in Norwegian winter exercises, and the training was primarily in SR and DA."[291] The Arctic training is primarily derived from the Scandinavian Arctic (northern Sweden and Cold Response in Norway), and is a result of a bottom-up evolution, and not Arctic strategic guidance.[292] Due to operational tempo, unit-level Arctic exercise, participation has been reduced, while operator qualifications remain.[293] The Air Force trains for the Arctic—and have for years—to include survival training Pituffik (Greenland), Exercise Cold Response (Norway), and annual or semi-annual, unit-level winter qualification training in Norway. Elements of this training have been integrated with Danish SOF.

d. Materiel

Danish SOF lack acquisition directives to develop further Arctic material capabilities. Current directive has been surpassed by the increased political focus and

290 Colonel Steen Ulrich, in email correspondence with authors, September 24, 2014.

291 Lieutenant-Commander Stefan Neubauer, in email correspondence with the authors, September 29, 2014.

292 Lieutenant-Colonel Poul Ebstrup, in discussion with authors, May 18, 2014.

293 Lieutenant-Commander Stefan Neubauer, in email correspondence with the authors, September 29, 2014.

reality.[294] The individual operator (Arctic) equipment is very good; however, tactical mobility is an issue, and there is a joint working group looking at creating an Arctic "pool" of equipment.[295] The Air Force F-16 units, which may support SOF in a surveillance role, are currently assessing their Arctic material capabilities.[296] The ATW and MARHELO Arctic capabilities are considered fundamentally sound, but must be assessed together with future contingencies. Though the EH-101 and the AS-550 are winter and Arctic capable, the AS-550 must be assessed in light of a future Arctic mission, due to the weather in the Arctic, the somewhat limited range, no air-to-air refuel capability, and a lack of ship qualifications. The recent acquisition of the MH-60R Seahawk is Arctic specific, and will augment Danish Arctic SOF capabilities, while the Air Force Arctic SOF capability has increased over the past few decades.[297]

e. Leadership and education

Danish SOF and select Air Force personnel undergo NATO SOF planning and leadership training. Furthermore, the Air Force HW has an increased focus on developing leadership guidance for Air Mission Commanders in support of SOF. There is no specific Arctic SOF leadership training.

f. Personnel

There is no Arctic-specific SOF leadership guidance or education within Danish SOF. However, the SOF units maintain their own cadre of instructors in order to maintain Arctic and winter qualifications.

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294 Commander Mogens Christens, in discussion with the authors, May 18, 2014.

295 "The JGK will need to acquire Snowmobiles and Bandvagen," Lieutenant-Colonel Claus Wammen, in discussion with authors, May 18, 2014.

296 Danish Ministry of Defence, "Press Release (Regarding Flights on the West Coast of Greenland)," [translated from Danish], Copenhagen: August 5, 2014, http://www.fmn.dk/nyheder/Pages/flyvning-med-F-16-over-groenland.aspx.

297 Colonel Steen Ulrich, in email correspondence with authors, September 24, 2014.

g. Facilities

Because Denmark is small in relation to the Arctic, it will be the infrastructure in the Danish Arctic—in particular, Greenland—that will be important. Therefore, it appears that the facilities under the Danish Joint Arctic Command must be evaluated to see how it can support Danish SOF employment in the Arctic. Currently, Danish F-16s are deployed to the west coast of Greenland to achieve two objectives: 1) to test the F-16 as a sensor platform for SAR missions, to include surveillance and picture generation, and 2) to test the logistic capability of the facilities in Kangerlussuaq and Thule,[298] in relation to F-16 operations. "Apart from the headquarters in Nuuk and a liaison element in Tórshavn (the Faroe Islands), the Arctic Command maintains a liaison element on Thule Air base in North Western Greenland. Additionally, there are facilities in Kangarlussuaq, Station North, SIRIUS [dog sled patrol] in Danebord, Mestersvig and Air Base Aalborg."[299] The ATW units also maintain facilities in Greenland, Kangarlussuaq, to support current operations.

h. Interoperability

Denmark is reliant on strategic partnerships. "NATO remains the cornerstone in Danish security and defense policy, and sets the framework for the close transatlantic cooperation"[300] Denmark has committed to provide a SOCC to NATO by 2018. The JGK has been tasked to provide a SOLTG, and the FRK is tasked to provide a SOMTG. Finally, Denmark has also committed to provide a SOATG (C-130J and EH-101).[301] This is a huge challenge for Danish SOF and supporting units. It requires a large degree of interoperability. In order to achieve necessary strategic relations, the JGK has close relations with SOF units from the United States, Great Britain, Australia, Switzerland, Germany, Norway, Sweden, Finland, the Netherlands, and Slovakia. To achieve

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298 Danish Ministry of Defence, "Press Release (Regarding Flights on the West Coast of Greenland)."

299 Arktisk Kommando, [translated from Danish] Nuuk, August 6, 2014, http://www2.forsvaret.dk/VIDEN-OM/ORGANISATION/ARKTISK/Pages/Arktisk2.aspx.

300 Danish Ministry of Defense, "Defence Agreement 2013–2017," Copenhagen, November 2012, http://www.fmn.dk/videnom/Documents/Aftale_paa_forsvarsomraadet_2013-2017a.pdf.

301 Forsvarskommandoen (Defense command, Denmark), "Vaernsfaelles Specialoperations styrker," 8.

interoperability through multinational joint integration,[302] the JGK has, since 1995, hosted an annual Exercise Night Hawk. The FKP Cooperates with Partners from the Unites States, Great Britain, Switzerland, Germany, Norway, and Sweden.[303] Like the Netherlands, Denmark is represented at USSOCOM and at NSHQ. The Air Force primarily aligns procedures and improves interoperability through Exercise Night Hawk and Exercise Cold Response. Apart from achieving interoperability through exercises and exchange of lessons learned, communication is identified as one of the major challenges.[304]

i. Conclusion

Denmark maintains an Arctic SOF capability; however, due to other commitments, this capability has been somewhat reduced over the past decade. The Danish Arctic SOF capability is founded in the Scandinavian Arctic, and is not a result of a strategic focus, but rather a bottom-up unit level focus. This may change with the recent Danish political focus on the Arctic and restructuring of the Danish SOF organization. While Danish SOF has partaken in multiagency operations in the North Atlantic, Danish SOF still needs to test to what degree current capabilities will suffice in Greenland and beyond. Communication and mobility are issues already identified as areas of improvement. AAR refueling and the Danish Air Force ability to operate in the Arctic are also evolving. However, current directives limit the ability to acquire new materiel. Danish doctrine and TTPs are derived from NATO. Danish SOF have many international partners. For the future of SOF in the Arctic, Denmark can expect to cooperate with other nations and agencies, therefore, Arctic SOF capabilities must evolve to ensure interoperability with partner nations.

4. NLDSOF Arctic Capabilities

Within the NLD DOD, there are two SOF units: an Army SOF unit, *Korps commandotroepen* (KCT), and a Navy SOF unit as part of the Royal Netherlands Marine

302 Ibid., 14.

303 Ibid., 19.

304 Lieutenant-Colonel Claus Wammen, in discussion with authors, May 18, 2014.

Corps (RNLMC), called The Netherlands Maritime Special Operation Forces (NLMARSOF). Unlike the United States and Denmark, the Netherlands does not have a formalized Special Operation Command (SOCOM), but instead a Special Operations Liaison element (JSO) within the DOD Operations Directorate, with a more limited role and responsibility. Both SOF units remain under the responsibility of their respected services. The Netherlands lacks an Air Force SOF unit, and is currently in the process of acquiring this capability. For now, 'flight 5' of the Royal Netherlands Airforce (RNLAF) 298 sqn, is the designated unit to work with the NLD SOF units. This flight is equipped with CH47F's and have so called 'provisions for' working with SOF units. More than their U.S. SOF counterparts, NLD SOF relies on non-SOF—or conventional support. This includes specialized materiel, personnel (enablers), transportation, and (mobile) facilities.

a. Doctrine

Within the NLD DOD, different services are appointed by the Chief of Defense (CHOD) as subject matter experts (SME) for different types of military operations/environments. The RNLMC, as part of the NLD Navy, is responsible for military operations in an arctic, mountainous and jungle environment. In order to support the NLD DOD units when operating in these environments, the RNLMC established a center of excellence (COE) in support of military operations in extreme environments and terrain. This center regulates all education of specialists, requirement of critical equipment and doctrine used in Arctic and jungle environments and mountainous terrain. Specifically for SOF, there is a Joint COE that deals with doctrinal development for SOF in general. However, this organization remains within the Army SOF organizational structure, and therefore does not cover NLD SOF units. This organization lacks the manpower and knowledge to write separate doctrine for SOF. Following is the current doctrine used by NLD SOF for operations in the Arctic:

- Dutch Joint Publication for military operations in extreme environments: *Leidraad Militair Optreden onder Extreme Omstandigheden* (2010).[305]
- Dutch Manual for military operations in the Arctic, *Handboek Militair optreden in de Arctic* (2014).
- NATO ATP-17 *Naval Arctic Manual* (April 2014).
- ATP 3.2.1. (2nd study Draft, March 2008) NATO Research and Technology Organization, Prevention of Cold Injuries (RTO-MP-HFM-126). STANAG 7141 EP (Edition 5).
- *U.K. Cold Weather Standing Operating Instructions* (CWSOI's), 2nd ed. (2005).
- *U.K. Army (2003) Field Manual Volume 2*, *Operations in Specific Environments*. Part 4, Cold Weather Operations.
- U.S. MCWP 3–35.1 Cold Weather Operations (2000).

Neither within NLD DOD nor NATO there is a document on military doctrinal that only discusses military doctrine in the Arctic region. Because of similar environmental circumstances in high mountainous terrain, Mountain and Arctic (M&A) warfare are often combined on the doctrinal level. On the manual level and below (SOPs and SOIs), distinction is made between the two.

b. Organizations

The NLD DOD does not organize or align its SOF units according to different (environmental) regions. Within the KCT, one of the four *commandotroepen compagnieen* (COTRCIE) is dedicated for SOF operations in M&A environments. Within NLMARSOF, one troop is specialized in M&A warfare. Because all other teams are basic-Arctic-trained,[306] NLMARSOF is able to task organize a unit to deal with any military contingency in the Arctic region.

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[305] Koninklijke Marine, "Leidraad: Militair Optreden onder Extreme Omstandigheden," [Manual for Military Operations in Extreme Terrain and Enviornments] 2010, http://www.kvmo.nl/pdf/id-mox.pdf.

[306] Basic M&A trained means that the individual operator successfully completed a three week Mountain Movement and Survival Course (MMSC), a three-week Arctic Movement and Survival Course (AMSC), and a two week Winter Warfare course.

c. Training

Biannual M&A training on the northern flank of NATO (Northern Norway) has been an integral part of the training cycle of the RNLMC. Although NATO's Northern flank is not threatened as in the past, RNLMC and NLMARSOF units still go there annually because of the belief in a basic principle, "if you can survive and fight in the Arctic, you are able to survive and fight anywhere else in the world." The KCT is traditionally less focused on the Arctic, and has gained interest since the late 1990s. On an annual basis, both KCT and NLMARSOF participate in Norway as SOTG land or maritime in the NATO (SOF) exercises COLD RESPONSE and TUNDRA. Furthermore, subunits of NLMARSOF participate annually in their own Arctic Exercise SNOW PACK. The location of this exercise varies between Norway and Canada. In addition to the joint Arctic (SOF) exercises, the Air Force's CH47F's have their annual COLD BLAZE exercise in Norway, to train under Arctic 'white out' conditions.

Since The Netherlands does not possess any training facilities relevant to mountain and arctic training, facilities in Arctic countries like Norway and Canada provide the required support for basic training. The concept of sea-basing using Dutch or Allied shipping is often used by NLMARSOF during more advanced training in the Arctic region. This is possible off the coast of Northern Norway but will be more difficult in other parts of the Arctic region because of amounts sea ice cover.

d. Materiel

All the operators within the Netherlands SOF units have additional M&A clothing and equipment to operate in the Arctic region. This is significantly different from what the conventional RNLMC units receive. As for mobility and over-snow capability, NLMARSOF has snowmobiles in their inventory. Other over-snow vehicles possibly utilized by SOF are the *Bandvagens* type BV206 and the armored BVS10 Viking. Both are within the inventory of the RNLMC. Similar to their USSOF counterparts, the CH47F's of flight 5 have the necessary provisions for operating in the Arctic region. This includes skids for landing in the snow and heaters to enable mechanics to work on the helicopter under arduous conditions.

e. Leadership and Education

There are no joint learning objectives for military operations in the Arctic articulated for any professional military education of NLD (SOF) officers. Other than a general awareness on the process of climate change and possible consequences including the 'so what' for future military operations, no arctic specific guidance exists. On the operational and tactical level, officers are trained in continuation courses after their initial Arctic training. Some RNLMC officers attend the Allied winter warfare course or the commanders' winter warfare course at the Norwegian COE for cold weather operations.[307]

f. Personnel

Any Arctic capability relies on capable individuals to accomplish an assigned mission. The Netherlands SOF personnel, like their Danish and U.S. SOF counterparts, are selected and trained according to the highest standards. However, that does not qualify them automatically as effective operators in an Arctic environment. The Netherlands SOF relies upon Mountainleaders (ML), and to a lesser degree, on *Heeresbergfuhrers* (HBF), to train and maintain Arctic trained SOF personnel. MLs are an elite cadre within the British and Dutch Marine Corps who are experts in long-range reconnaissance, Arctic warfare, and mountain climbing. As the ML Training Cadre (MLTC), their primary peacetime role is to teach their techniques to other Commando Troops and share their expertise with other military units.[308]

Between three and six NLMARSOF ML instructors are trained in the UK every year. The HBF are the Army mountain guides within the German and Austrian Armies. At least one NLMARSOF HBF instructor is trained in the German course every year. NLMARSOF relies on a mix of ML and HBF instructors for their Arctic capability. The

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307 Norwegian School of Winter Warfare (NSSW) as part of the NATO Centre of Excellence - Cold Weather Operations (COE–CWO), http://mil.no/education-training/nsww/Pages/Commanders-Winter-Warfare-course.aspx.

308 Elite U.K. Forces, "Mountain Leaders," http://www.eliteukforces.info/royal-marines/mountain-leaders/.

KCT trains one or two HBF instructors in the Austrian course, and relies solely on their HBF instructors to train their units in Arctic warfare.

g. Facilities

The Netherlands does not have any military facilities close to, or in, the Arctic region, and rely completely on the facilities of partners when deployed in the region. The NLD DOD, however, has strategic sealift capabilities that can also be used as a military facility from where to launch, command, and sustain military operations in the Arctic region.[309] As with most navies, these ships do not have an ice-strengthened hull, and are only able to operate in seas with the classification "very open ice," and when the ice is classified as "new/grease ice, no thicker than 10cm.[310]

h. Interoperability

For the Netherlands, a small nation from a military (SOF) perspective, interoperability with strategic partners is essential. Almost all deployments of SOF units in the past 15 years have been conducted in a multinational and joint environment, working closely together with other NATO SOF members. NLD SOF units have developed an exceptional relationship with German, Norwegian, Belgian, and British SOF.[311] U.S. SOF remains the closest strategic partner for NLD SOF,[312] working and training mostly with the USSOF units assigned to U.S. SOCEUR.

During different SOF exercises in the Arctic such as COLD RESPONSE, TUNDRA, and SNOW PACK, the NLD SOF tries to train in a multinational setting. During the last COLD RESPONS evolution in Norway, NLDSOF and U.S. NSWU-2 deployed a joint SOMTG. Another example is the last SNOW PACK evolution where NLD, CAN, and AUSSOF operators and teams worked together in an Arctic

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309 These are two Landing Platform Dock (LPD) ships of the Rotterdam class, and a Joint Support Ship (JSS) of the Karel Doorman class, within the Royal Netherlands Navy (RNLN).

310 North Atlantic Treaty Organization [NATO], *Naval Arctic Manual (ATP 17(D)),* 4-1.

311 The U.K. Special Boat Service (SBS), the Norwegian *Marinejegerkommandoen* (MJK), Belgian Special Forces Group (SFG), and the German *Kommando Spezialkräfte* (KSK).

312 Colonel Jarst de Jong, in discussion with authors, May 15, 2014.

environment. Experience gained with partners during missions and the continuing joint exercises as mentioned, which greatly enhanced interoperability. Critical SOF equipment like radios and weapon systems are interoperable with most of the NATO SOF partners. Resources are pooled, and doctrine and SOPs, SOIs, and LLs are shared through the NSHQ.

NLD SOF participates in the NATO Special Operations Headquarters (NSHQ) and the Global SOF Network, and has permanent liaison officers with U.S. SOCOM and U.S. ARSOF. An exchange program between NLMARSOF and the U.S. Navy SEALS is currently being coordinated.

i. Conclusion

It is fair to state that Dutch SOF has a reasonable Arctic capability. The units are well trained and equipped, and have sufficient enabling capabilities. On the tactical level, the Arctic capability has somewhat degraded due to other operational commitments; however, it has not resulted into incapability. There are important capabilities lacking for Dutch SOF, which could have an effect on SOF operations that are conducted unilateral in the Arctic region. These are strategic lift/mobility and an AAR capability. Therefore, to overcome these shortfalls, operating within a multilateral construct when operating in the Arctic region, is key for Dutch SOF.

5. USSOF Arctic Capabilities

As previously described, the Arctic is an ever-changing harsh environment, where unique infrastructure, mobility, and life-support capabilities are necessary. USSOF is not a service component within the U.S. military, and they do not operate SOF-pure military bases. USSOF units are tenant units with conventional military forces on conventional military bases. Additionally, USSOF units are much smaller than each of their respective conventional service counterparts. Therefore, a noteworthy aspect of USSOF Arctic capability is implied in the USSOF truth: “Most Special Operations require non-SOF

support."[313] USSOF organizations depend on non-SOF materiel, facilities, and transportation. As a result, the capability analysis of USSOF will involve frequent references to the Arctic capability of the U.S. conventional military. USSOCOM has recently initiated a program for global interoperability with allied SOF partners, called the Global SOF Network,[314] on which an international capability for the Arctic might depend, as well.

a. Doctrine

The U.S. military uses doctrine as a guide for leaders when forming a plan. There are several levels of doctrine, each pertaining to the relevance of the operational environment, forces involved in the operation, and the nature of the mission being performed. Outside of the guidance of doctrine, the institutional experience, situational understanding, and judgment of the service members forms the rest of the military planning process. The U.S. DOD currently uses the following doctrinal manuals for the training and execution of cold weather, mountain, and maritime exercises and operations.

- ATTP 3–97.11 and MCRP 3–35.1D, *Cold Region Operations* (2011).[315]
- *Northern Warfare Training Center: Cold weather Operations Manual* (2000).[316]
- *JP 3–50, United Sates National Search and Rescue Supplement to the International Aeronautical and Maritime Search and Rescue Manual* (May 2000).
- Several training circulars and manuals exist at the lower-unit levels for the individual service member operating in cold weather and mountainous environments.

313 U.S. SOCOM Public Affairs, "United States Special Operations Command Fact Book: 2014," 2014, http://www.socom.mil/News/Documents/USSOCOM_Fact_Book_2014.pdf.

314 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, I-1.

315 U.S. Headquarters Department of the Army, *Cold Region Operations* (FM 31-70 and FM 31-71, C1) (Washington, DC: January 28, 2011), http://armypubs.army.mil/doctrine/DR_pubs/dr_a/pdf/attp3_97x11.pdf.

316 U.S. Army Alaska, *Northern Warfare Training Center: Cold weather Operations Manual*, October, 2000, http://www.tacsafe.net/resources/General/AlaskaColdWeatherManual.pdf.

The Arctic is a unique environment with a combination of sea, sea-ice, and constantly changing ice masses. Though there is not a significant dependence on doctrine, doctrinal guidelines are critical when considering military operations and the effects on military forces in such an unforgiving environment. Additionally, the current list of doctrine for cold-weather regions is more relevant to mountainous or alpine environments, not necessarily to such extreme temperatures over such unpredictable terrain as the arctic. Consequently, there is an insufficient level of doctrinal publications relative to operations in arctic environments available for use.

b. Organization

With the exception of a few capability-based units, USSOCOM, the HQ organization for USSOF, does not organize its forces in a specific manner to respond to regions based on their geophysical (atmospheric or meteorological) conditions. The exception being Navy SEALs, who are obviously the force of choice when responding to maritime-focused regions, and Special Forces units who conduct language training specific to their area of operations. Additionally, the majority of USSOF is not so specifically trained for a region based on the geophysical environment that would preclude a unit from being tasked for Arctic operations.

Typically, USSOF units are aligned to a global region under the command relationship with a theater combatant command (COCOM). The TSOC is OPCON to the Geographic Combatant Commander (GCC).[317] As a result of this command relationship and habitual engagements in a respective theater (or region), the USSOF unit adapts their procedures and materiel capabilities to meet the mission requirements. Therefore, the organization itself is similarly constructed to that of USSOF elements aligned to different regions of the world. Duplicate units in their respective service branch are also similarly manned with support functions necessary for USSOF operators to conduct their missions. For example, Special Forces Groups are organized with similarly manned intelligence, support, and enabler units. Certain units have the opportunity to train for unique environments by virtue of their home station location. For example, the 10th Special

317 U.S. Department of Defense, *Joint Publication 3-05, Special Operations*, I-3.

Forces Group is headquartered in Colorado. Colorado provides ample opportunities to train in cold weather, snow, and mountainous environments. By virtue of their COCOM relationship, the 10th Special Forces Group, coincidentally, has the opportunity to operate in a similar cold-weather, mountainous environment in the European area of responsibility. Additionally, each Special Forces group is organized with a minimum of three Operational Detachment Alphas (ODA) trained for combat operations in mountainous and cold-weather environments; however, neither cold weather nor mountain training, merits an Arctic capability.

USSOCOM may not organize their forces based on the geophysical environments of the world. However, the traditional COCOM alignments and areas of operation have a shaping effect on the unit's capabilities. Furthermore, the current USSOCCOM initiative has units that remain regionally aligned and oriented in order to increase familiarity and success in the region.[318] As a result, certain "legacy skills" become expected of the units, and commanders rely on these skills in the time of need. At a recent meeting of senior Special Operations leaders, such expectations for Arctic capabilities were expressed by Rear Admiral Kerry Metz, stating that he expected 1st and 10th Special Forces Groups to respond in the Arctic.[319] However, cold-weather regions vary from mountainous to maritime, and proper pre-mission training could prepare other less-obvious USSOF units to respond in the Arctic. For example, NSWG-2 previously participated in Exercise Cold Response, where cold-weather specific skills were learned in an international exercise environment. Among the different service components—Army, Navy, Air Force, and Marines—each component possesses units and equipment designated specifically for operating in "cold-weather" regions.

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318 William H. McRaven, "Posture Statement of Admiral William H. McRaven, USN, Commander, United States Special Operations Command Before the 113th U.S. Congress House Armed Services Committee,"
http://www.socom.mil/Documents/2014%20USSOCOM%20POSTURE%20STATEMENT.PDF.

319 McLeary, "U.S. Special Ops Commanders: We need ISR in Africa, Comms in Arctic."

c. Training

Closely tied to interoperability, training is the most essential aspect of DOTMLPFI, as it is where a capability will degrade the most if not conducted regularly. Training is where the combination of all other components of DOTMLPF-I must come together to develop a capability. As with any non-traditional skill, the old adage "use it or lose it" would best describe the region-specific skills needed for operating in the Arctic. Additionally, basic skills learned through training must be established before more advanced skills can be introduced to an individual and a unit. For reasons varying from classification to operational requirements, USSOF have not traditionally participated in international training exercises that revolve around Arctic climates. The large majority of SOF elements spend what training time they have available preparing for the upcoming operational deployment, or pre-mission training (PMT). Based on their assigned COCOM area of responsibility, USSOF pre-mission training often replicates the environment of their mission. Further, as stated previously, the U.S. military has limited engagements in the Arctic, and thereby, does not focus much training on arctic environments.

Based on research and interviews during this study, it has been concluded that no habitual training has been conducted by USSOF for operations in an arctic environment. The decentralized nature of SOCOM allows the component Commanders to focus their training needs to meet operational requirements. No training requirements exist for mountaineering units within SOCOM to maintain their proficiency through structured training at regular time increments. However, the historically low demand for USSOF, specifically in the Arctic, combined with budgetary constraints and an increase in emerging requirements in other regions of the world, has resulted in little-to-no focus on training for operations in the High North.

When training is conducted, it is closely tied to facilities, as facilities provide the infrastructure and personnel support needed to replicate the most realistic conditions for mission preparation. Several training venues exist where cold weather tactics can be trained and exercised. Although USSOF can conduct training for cold weather operations in non-standard regions, the following locations are standardized training facilities that formal instruction and dedicated sites for such training can be conducted.

- NSWC Det-Kodiak, Kodiak Island, AK.
- The Special Operations Forces Cold Weather Maritime Training Facility, Naval Special Warfare Center Detachment-Kodiak located at Kodiak Island, AK, would be an optimal location for the training of USSOF elements in an arctic-replicated environment. Currently, the site is used for short periods of cold weather training and familiarization of NSW candidates as they conduct their training pipeline.[320]
- Northern Warfare Training Center, Fort Wainwright, AK.
- The Northern Warfare Training Center, located at Fort Wainwright in Alaska, is where service members and SOF from all branches can attend school and training on tactics in arctic and mountainous environments.[321]
- U.S. Army Mountain Warfare School, Camp Ethan Allen (CEAT), Vermont
- While the Army Mountain Warfare School primarily focuses its training on combat operations in mountainous environments, the majority of training is conducted in cold weather environments, while the course provides education of considerations in cold weather environments.[322]
- Special Forces Advanced Mountain Operations School (SFAMOS).
- The Special Forces Advanced Mountain Operations School is located at Fort Carson, Colorado. Previously a unit-operated course taught by and for members of the 10th Special Forces Group, SFAMOS became a part of the U.S. Army John F. Kennedy Special Warfare Center and School in 2012. Since this time, the course has instructed USSOF units and personnel from all branches of the U.S. military. Although the course is not specifically taught for cold-weather operations, the SFAMOS cadre members maintain their proficiency in military operations over snow

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[320] Specialist 2nd Class Erika Manzano, Naval Special Warfare Public Affairs, "SEAL Candidates Prove Survival Techniques in Alaska," Navy.mil, April 14, 2009, http://www.navy.mil/submit/display.asp?story_id=44255.

[321] The mission statement of the Northern Warfare Training Center is "to provide relevant training to the leaders of USARAK units so that they can fight and win in demanding cold weather and mountain environments," http://www.wainwright.army.mil/nwtc/index.html.

[322] U.S. Army Mountain Warfare School: "Mission and Purpose," http://www.benning.army.mil/infantry/amws/mission.htm.

through unit-assisted training with the 10th Special Forces Group between classes.[323]

As mentioned earlier, several international exercises exist in cold-weather regions. One way to capitalize on the relationships within the international SOF community and reinforce the interoperability of the Global SOF Network is to participate in annual and bi-annual international training exercises, specifically oriented to an Arctic environment. Such exercises already exist and have significant international participation. They include:

- Cold Response: a Norwegian-led winter exercise held six times since 2006 in Norway. More than 15,000 soldiers from 15 different nations have participated in at once in previous exercises.[324] The most recent exercise rotation was held in March of 2014.
- Nanook- an annual exercise hosted by Canada that takes place in several locations along the north and north-west regions of the Canadian territories. The most recent exercise took place in the Baffin Island region from August 20 to 29, 2014. The exercise focused on SAR operations in conjunction with some 800 international and intergovernmental participants.[325]
- Jackal Stone (by exception, if relocated to a more Arctic-like location).

d. Materiel

Currently, a small number of USSOF units possess SOF-peculiar equipment designed for cold-weather regions. For example, some USSOF units possess snowmobiles within their inventories; however, there are a large portion of terrain in the Arctic that is not traversable by snowmobiles or any land-based transportation. Reportedly, USSOCOM has purchased a cargo ship to transform it into a SOF-specific naval platform from which special operations could be conducted and supported, called

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[323] Dave Chace, "Special Forces Advance Mountain Operations School announces dates," May 21, 2012, The Official Homepage of the United States Army, http://www.army.mil/article/80111/Special_Forces_Advanced_Mountain_Operations_School_announces_course_dates/.

[324] Tom O. Ovind, Chief Editor: Chief of Norwegian Armed Forces Media Centre, "Norwegian Armed Forces: Cold Response," http://mil.no/excercises/coldresponse/Pages/about.aspx.

[325] National Defence and the Canadian Armed Forces, "Operation Nanook," August 29, 2014, http://www.forces.gc.ca/en/operations-canada-north-america-recurring/op-nanook.page.

sea-basing.[326] The idea of sea-basing is a concept where all of the functions provided by a land base are located on a naval ship and can be strategically located for mission requirements.[327] To overcome the lack of suitable land from which to conduct or launch operations, the concept of sea-basing is one of several solutions. Another strategic lift capability exists in the 109th Airlift Wing, located in New York. The 109th possesses six LC-130 air platforms that have ski-equipped landing gear designed for landing on and taking off from snow and ice covered surfaces.

Based on the Arctic's reduction in sea ice and projected increase of waterways, any mobility in the region will undoubtedly involve ships with ice-hardened hulls. As the ice continues to melt, the need for ice-hardened hulls will decrease, increasing the viability for more conventional surface ships. In years past, the United States has never had a sizable fleet of ice-capable ships, at its height of six from 1942–1945. Currently, the U.S. has five ice-capable surface ships, of which one is unavailable for service, and two are government owned. The Coast Guard maintains the two available surface ships, which are the minimum numbers for an operational rotation.

Located in Alaska, Fort Wainwright is home to the Stryker brigade, which is equipped with the Stryker fighting vehicles, making an infantry brigade not only highly mobile, but also easily transportable. The aviation battalion on Fort Wainwright is equipped with UH-60A Blackhawks and CH-47 Chinooks, which are used to increase the mobility of infantry and combat support units.

Joint Base Elmendorf-Richardson (JBER) is also located in Alaska. JBER is the largest installation in Alaska. Between the two Air Force units that compose the preponderance of forces at JBER, they possess several airframes and technical systems to not only mobilize the infantry units located at JBER, but to also provide airborne reconnaissance and intelligence requirements to military forces committed to the

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[326] David Axe, "The Navy's Getting a Big, Secretive Special Operations Mothership," 2014, https://medium.com/war-is-boring/the-navys-getting-a-big-secretive-special-operations-mothership-12801da6f353.

[327] Sam Tangredi, "Sea Basing: Concept, Issues and Recommendations," *Naval War College Review* 64, no. 4 (Autumn 2011), Strategic Insight, https://www.usnwc.edu/getattachment/d49d4281-7790-435d-9b3f-c7df59fb1544/Sea-Basing--Concept,-Issues,-and-Recommendations.aspx.

PACOM AOR.[328] Additionally, the Air Force maintains two fighter squadrons, two engineer squadrons, and several combat and mission support units. The Army units located at JBER are mostly light infantry and combat support to infantry. Although the infantry and support units conduct training regularly in the cold-weather regions of Alaska, the equipment used is the same equipment traditionally used by military forces in other regions of the world. Currently, there are no significant materiel capabilities within the Alaska-based units that would differentiate them from units stationed in other regions of the world.

USSOF are no more equipped with "special" equipment for missions than conventional U.S. military forces. Most SOF-peculiar equipment is conventional military equipment with modifications. In past years, USSOCOM has made an effort to prevent the redundancy of equipment procurement under limited budgets.[329] For example, the radios, weapons, and vehicles that USSOF personnel use are typically the same items that conventional forces use, with minor modifications for the mission. For this reason, the evolution of USSOF materiel is moderately tied to conventional military force modernization initiatives. The more optimal the conventional U.S. forces materiel and equipment are suited for the Arctic, the more optimally USSOF will be suited for the Arctic. Where mission requirement exceeds conventional equipment capabilities, procurement of SOF-peculiar equipment would be necessary. Additionally, USSOCOM has the ability to procure or purchase specialty equipment to meet operational requirements. As the requirement for operations in the Arctic evolve, so too must the materiel to support and protect the SOF operator. As described in this section, the U.S. DOD possesses only a few materiel resources that are suited for the Arctic; however, the incorporation and familiarization by the SOF community has not happened to constitute a capability.

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[328] Mission Statement of the 3rd Wing, located at JBER: "provide the Commander, U.S. Pacific Command, trained and equipped low observable air dominance assets, airborne command and control platforms and global airlift resources for theater-wide contingency operations and also provide the Commander, U.S. Northern Command, immediate early airborne detection, warning, surveillance and interception of hostile forces within the Alaska North American Aerospace Defense Command Region." http://www.jber.af.mil/3wg/index.asp.

[329] U.S. SOCOM, "FY 2015 Budget Highlights," 2014, 2–5, http://www.socom.mil/News/Documents/FY%202015%20USSOCOM%20Budget%20Highlights.pdf.

e. Leadership and Education

The educating of military leaders on matters of the Arctic will likely be developed similarly to the education base for areas where the military was previously uninvolved, through the combination of training, evaluation, and archiving the best practices and techniques. The USSOF community has recognized the importance of lesson learned over the last decade of war and has developed a relatively effective system for the training and integration of information for the use of professional education. Based on the lack of operational requirements in the Arctic and minimal participation in arctic-specific training exercises, there stands to be somewhat of a deficit of leadership and educational material related to this region. With the recent realignment of COCOMS, under which NORTHCOM is assigned responsibility of the U.S. Arctic, the leadership deficit that has existed in years past will begin to decrease and operational experience will build a foundation for regional education.

f. Personnel

USSOF personnel are often chosen through rigorous selection programs that test operator's physical fitness and more importantly, their decision making. The combination of politically sensitive situations and harsh, unforgiving terrain demands the warrior diplomacy that USSOF have institutionalized over the years. USSOF are often called upon to perform functions that require personnel numbers and equipment restrictions that are often smaller than conventional forces can effectively respond to. Though most would describe this type of response as "ad-hoc," the personnel of whom these units consist are mature, seasoned, and intuitive. These characteristics can often offset the need for additional personnel or increased equipment to accomplish the tasks. Most USSOF units are organized to facilitate split-team or single-operator missions, often in different geographic regions. Most importantly, the parent SOF unit understands the importance of the demands for tailored responses and has built in mechanisms that can deploy USSOF operators in different size units in a timely manner, without compromising the integrity of the remaining parent unit. As a result, SOCOM's ability to construct a dynamic response

of small units tailored to the crisis is a critical capability when operating in the unpredictable Arctic.

g. Facilities

Though not critical to merit as Arctic capability, facilities are relative to the strategic movement capability of a given military force. Given it is improbable that a facility will be constructed in the Arctic, the proximity of facilities to support strategic movement and operational support decreases the strain on logistic support for mission. Lack of infrastructure can be offset by a strategic movement capability to sustain similar levels of operational success. The U.S. DOD has several military installations located in Alaska, which has a coastline within the Arctic Circle, north of the 66-degree latitude line. The geographic proximity of Alaska to the Arctic Circle implies that the military installations in Alaska would be a critical infrastructure for military capabilities in the Arctic and the neighboring regions from which USSOF would be able to conduct operations. The three most developed installations in Alaska (in order of size) are Fort Greely (smallest), Fort Wainwright (next largest), and Joint Base Elmendorf-Richardson (JBER), which is the largest base of the three.

Fort Greely is located in a remote part of Alaska, about 350 miles north of Anchorage. Within this installation reside the U.S. Missile Defense Agency, U.S. Army Space and Missile Defense Command, and the U.S. Army Cold Regions Test Center (CRTC). Additionally, Fort Greely is home to the Alaska Air National Guard, an active duty Army missile defense battalion, and a small garrison unit responsible for the cantonment areas and security of the base. Responsible for the ballistic missile defense of the United States and Alaska, this installation is smallest of the three bases, but shoulders the defense of the U.S. northern boundaries.

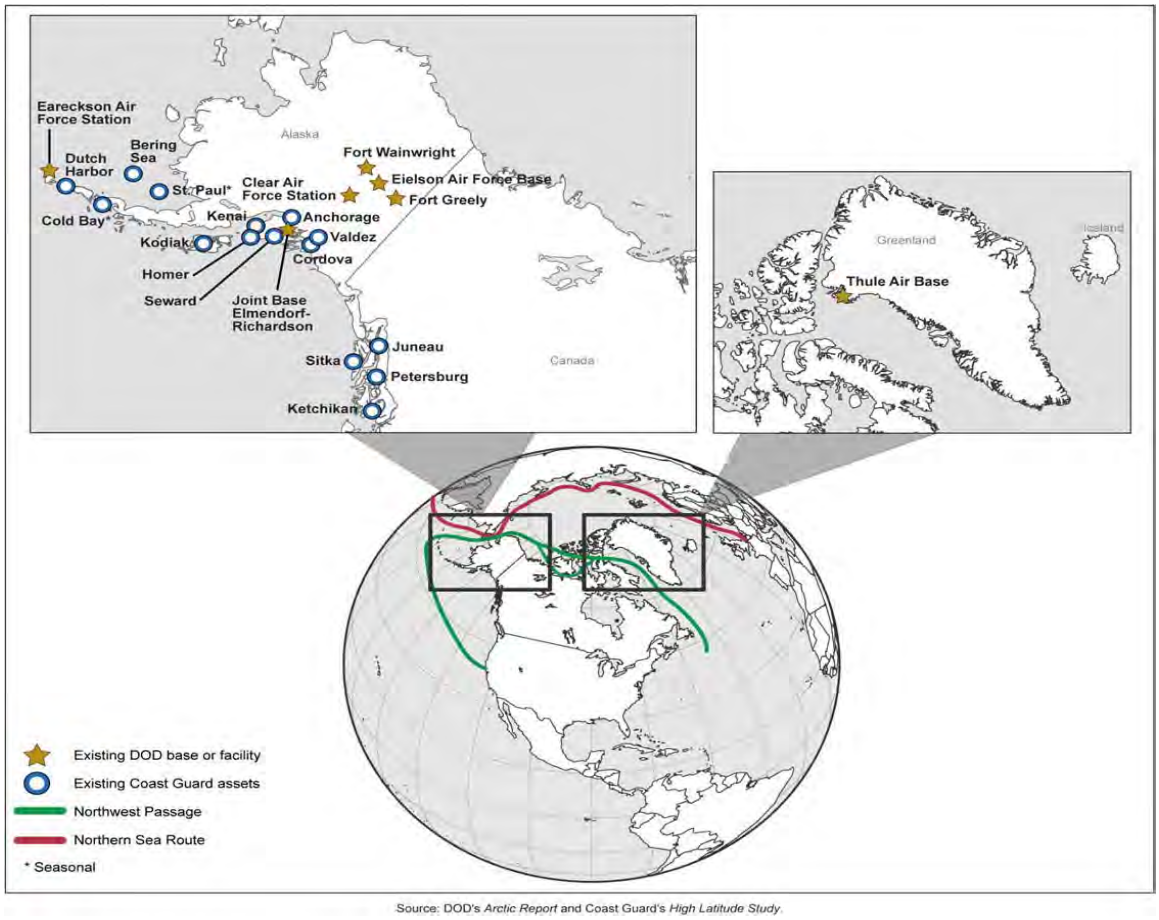
Next in order of size is Fort Wainwright. This installation is home to three active-duty infantry battalions, an aviation battalion, a Stryker infantry brigade, and several combat supporting units. According to the DOD, Fort Wainwright hosts approximately 7,500 soldiers and airmen.[330]

[330] Installation Overview: Fort Wainwright, Alaska, http://www.militaryinstallations.dod.mil.

Joint Base Elmendorf-Richardson, or JBER, is the largest military installation in Alaska. JBER hosts just over 16,000 active duty soldiers and airmen, as well as civilian staff needed to maintain administration and maintenance of the installation. Overseeing all of the military units located in Alaska is the Alaska Command (ALCOM) Headquartered at JBER. ALCOM is a joint headquarters consisting of Air Force and Army personnel. Also located on JBER is an Army brigade combat team consisting of two parachute infantry battalions, a reconnaissance squadron, a parachute field artillery battalion and other combat support units.[331] Furthermore, JBER is home station to two Air Force units whose purpose is to focus on homeland defense of the United States and threats emanating from the Pacific regions, as well as the Alaskan NORAD Region who are responsible for aerospace control of the Arctic and Pacific regions.

Several other installations located in Alaska are home to Army National Guard and Reserve units, Air Force units, and U.S. Coast Guard bases (see Figure 16).

[331] According to the USARAK list of only Army units provided on their website, http://www.usarak.army.mil/main/units.asp.



Source: DOD's *Arctic Report* and Coast Guard's *High Latitude Study*.

Figure 16. Current U.S. installations; stars are DOD bases (Army and Air Force) and circles are USCG bases.[332]

As illustrated in Figure 16, the U.S. military and interagency partners have a significant amount of infrastructure positioned throughout Alaska. Although most of the installations have been configured to focus their efforts to the Pacific region,[333] their proximity to the Arctic region is a strength that could easily be refocused to the High North.

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[332] Pendleton, et al, *Arctic Capabilities: DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near-and Long-term Needs*, 8.

[333] The Missile Defense Agency at Fort Greely, 1-25 SBCT and USARAK Aviation at Fort Wainwright, as well as the 4-25 BCT at JBER all answer to the PACOM Commander. "The brigade, along with 1st Brigade Combat Team (Stryker), 25th Infantry Division, which is also home-stationed in Alaska, share in the history of the 25th Infantry Division, but are not subordinate to the division; the chain of command goes direct from United States Army Alaska to United States Army Pacific," http://www.usarak.army.mil/4bde25th/.

h. Interoperability

The predominant theme of the Arctic is "diplomatic resolution of disputes."[334] Nevertheless, as the geophysical environment changes and resources become more accessible than ever before, international conflict over boundaries and sovereignty are bound to arise. Ad-hoc groups of decision makers from within the military who can command and control multiple agencies and units to react to crisis will play a critical role in the Arctic security Regardless of the manner in which the disputes are negotiated, the pure inaccessibility and nature of the climate will demand small, well-trained units with unique mobility platforms. For the reasons mentioned here, the SOF from each of the countries involved would be the unit that is best suited to meet these requirements.

i. Conclusion

In summary, USSOF do not currently possess an arctic capability, or one that can be claimed based on the specific nature of the arctic. There are disjointed capabilities spread throughout the DOD with differing strengths in an Arctic environment. However, when examined using the DOTMLPFI method of analysis, the gaps become apparent. The doctrine for operations in this type of region is relatively shallow and more suited for mountainous or alpine environments. As an organization, SOCOM may possess units with legacy skills closely suited for the arctic. However, research and interviews with TSOC and SOCOM staffs indicate that there is no regularly held training exercise or location used to develop a dedicated capability. As mentioned previously, training is the most important aspect of developing and maintaining a capability, and the lack thereof will just as effectively degrade a capability. This is where the analysis shows the most critical component of the capability gap. The current state of SOCOM equipment inventory finds that moderate climates of operational requirements have had an influence on materiel inventories, leaving USSOF ill prepared for arctic operations. USSOF personnel appear to be a strong and well trained aspect of this analysis; yet without materiel, they are vulnerable to the elements. Facilities are conveniently located and suited to support training and basing requirements. Finally, interoperability remains one

334 U.S. Department of Defense, "Arctic Strategy," 10.

of the USSSOF cornerstones, but does not transcend matters of the Arctic region at a level robust enough to constitute a capability.

IV. STRATEGIC RAMIFICATIONS OF THE CHANGING ARCTIC

This chapter conducts a weighted analysis of the strategic ramifications, distilled from the first three chapters of this thesis. This will help shape the vignettes used in the Chapter V. In the first section, the strategic ramifications are spelled out for the Arctic littoral nations by using the four elements of national power: Diplomatic, Informational, Military, and Economical. Although there are other ways of analyzing strategic ramifications, this thesis uses the DIME model since it is widely recognized and utilized in both NATO and U.S. doctrine. The second part of the chapter covers specific strategic conclusions for observer nations and other organizations like multinationals and non-governmental organizations (NGOs).

A. ARCTIC NATIONS

The geophysical environment in the Arctic region is changing. The data in Appendix A shows that this is happening at an unprecedented rate. The Arctic transformation is unique. What follows is an increasingly sensitive—and equally unique—geopolitical landscape driven mostly by economic incentives, with a growing list of stakeholders. Conflicting territorial claims and new avenues of approach into and through the Arctic region make security for the Arctic states a growing concern. At the same time, Arctic security issues are barely addressed in any formal setting. This leaves a vacuum for individual countries and other stakeholders to assess security issues in the region without discussing this with potential partners. Another significant observation, especially given the current crisis in the Ukraine, is the spillover effect of political and security issues in theatres outside of the Arctic region into the Arctic. Recent examples show that this affects how matters are dealt with in the Arctic, further complicating Arctic governance and security cooperation. As Kraska states, "the transformation now occurring in the Arctic is a tightening of the links between global forces and regional

processes … the Arctic is on the receiving end of a combination of forces whose origins lie far beyond the borders of the region itself."[335]

Given these observations it is fair to state that the Arctic is becoming an increasingly sensitive environment politically and militarily. This, in combination with the environmental challenges, will more than likely increase the demand for small, well equipped, specialized self-sustaining units able to conduct operations with a wide variety of OGAs in the full spectrum of conflict. Unfortunately and in sharp contrast, the current capabilities show that the ability for—especially U.S. SOF—to operate effectively in the region has significantly decreased over the last decade. This is a trend that must be rectified.

1. Diplomatic Power

> Diplomacy is a vital element in the spectrum of national security tools, which states use to achieve acceptable relations and mutual understanding. Diplomacy and military power can be combined to form a powerful tool of grand strategy.
>
> USMC Command and Staff College

> Only two ways exist for one nation to make another comply with its wishes. It can either *convince* the other nation through dialogue and reward (positive reinforcement) or *coerce* it through threat or use of minimal power projection (negative reinforcement).
>
> Alan J. Stephenson

The analysis of the A5 strategies and governing documents in Chapter II shows the current foundation for Arctic governance and diplomatic relations between nation-states in the Arctic region. Valid questions to ask here are what degree have the established governing bodies served their purpose and will they continue to do so with the massive increase of new Arctic stakeholders (nation-states, OGAs, and non-state actors)? The answer is most likely that they have not and will not. Current institutions will have to change in order to serve the increasing interest of new stakeholders. Or, as

335 Kraska, *Arctic Security in an Age of Climate Change*, xxxiii.

Kraska states, the Arctic states "are grappling with an emerging security paradigm."[336] It serves to remember that these institutions will be greatly dependent on the perceptions and relations of those actors that partake in their creation. Keeping in mind that there is still no venue for dealing with Arctic security matters, ASFR is an obvious choice; but Russia, the biggest Arctic nation, is currently excluded from this venue.

The different Arctic strategies reflect the volume of national interests at stake here. Some of the strategies also express the willingness to utilize military means to safeguard their national interests in the region. This is specifically mentioned in the Canadian, Russian, and Norwegian strategies.[337] Other Arctic stakeholders, like the new observer member China, are getting increasingly involved using their diplomatic power to increase their influence in, for example, Iceland and Greenland.[338]

What happens when the United States takes over the chairmanship of the Arctic council in 2015 is uncertain. However, it is clear that the issues outside the Arctic have great effect on the level and quality of cooperation in the different governing bodies in the Arctic. The current crisis in the Ukraine has sparked a Cold War sentiment between NATO and Russia that will have great consequences for matters of security in the Arctic region. This "return of geopolitics," as mentioned by Stephen F. Larrabee, and "the emergence of Russia as a more confident and assertive actor both globally and regionally,"[339] show there is a potential for future disputes to involve any form of military power as well. The vignettes in Chapter V will illustrate this and give insights on how SOF could be involved.

2. Informational Power

National governments develop information strategies to support national policy. For the United States—which appears as representative—it is defined as follows:

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336 Ibid., preface.

337 For further information see Appendix B. "Strategies of the Arctic Five."

338 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 55.

339 Stephen F. Larrabee, "Russia, Ukraine, and Central Europe: The Return of Geopolitics," *Journal of International Affairs* 63, no. 2 (2010): 33.

> Use of information content and technology as strategic instruments to shape fundamental political, economic, military, and cultural forces on a long-term basis to affect the global behavior of governments, supra-governmental organizations, and societies to support national security.[340]

From this view, it looks as if the information element is the face of the other three elements in DIME. To the degree this is true, it is important to remember that there is more than face value to strategic communication and information strategy. In international strategic communication, verbal as well as non-verbal aspects must be recognized; actions speak louder than words, and actually constitute the majority of the message. As such, it is in the actions, as mentioned previously, the real intentions are to be found.[341] Recent behavior inside the Arctic, but to an even higher degree outside of the Arctic, has showed glimpses of what could be a grand (information) strategy of Russia.

The institutions established within an Arctic context such as the Arctic Council represent venues for states to communicate national interest within a cooperative tone.[342] Putin's latest communication efforts regarding the Russian stance in Arctic matters are a clear indication of Russian policy, and information strategy, focused on national self-interest. The current crisis in Ukraine and the alleged use of Russian SOF inside of Ukraine shows how SOF can be employed in a sensitive environment. National self-interest is not merely a Russian phenomenon. Rather, every nation is expected to ultimately act out of national interest and not Arctic relations or the concerns of others.[343] This does not necessarily determine an anarchic path to crisis or conflict since "peace promotes prosperity,"[344] and thus peace is a matter of national interest as well. However, it does reinforce the importance of framing Arctic cooperation in order to create a basis

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340 USMC Command and Staff College, class 8902 AY13, lesson 2: 2-3.

341 Dennis M. Murphy, "Strategic Communication: Wielding the Information Element of Power," *U.S. Army War College Guide to National Security Issues* 1 (2008), 180.

342 The Arctic council, "The Ottawa Declaration of 1996 formally established the Arctic Council as a high level intergovernmental forum to provide a means for promoting cooperation, coordination and interaction among the Arctic States…," http://www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council.

343 USMC Command and Staff College, course 8902 AY13, lesson 7: 7-1.

344 Ibid., lesson 2: 2-4.

for security cooperation "in an age of climate change," repeating Kraska's emphasis on "how we choose to frame the issues will have profound effect on how we define the range of policy options available."[345] The Russian information strategy and the recent communication, in actuality, seems somewhat more reliable considering Russian actions outside of the Arctic region, where Russian activities inside Ukraine show the guiding principles of Russian security policy. This goes back to the "spill-over" effect from political matters outside of the Arctic possibly affecting policy inside the Arctic region.

The Canadian stance on Artic matters is perhaps at first glance more surprising; Canada, too, has claimed the North Pole, and Denmark is expected for follow suit. Canada is reluctant regarding NATO involvement in Arctic security matters,[346] a fact that creates a dilemma within NATO, where smaller nations like Denmark and Norway may seek strategic balancing through NATO in order to counter a rising Russia. It is within this paradox of cooperation and associated non-escalation (or military presence) versus preparation that SOF may be a useful tool as an extension of policy and diplomacy. It is also with this in mind that the stakeholder's information strategy must be interpreted.

3. Military Power

During the Cold War the Arctic region had significant military value for the hosting of ICBM. Furthermore, the Arctic region was important because it hosted an important part of the second strike capabilities of both world powers. With the collapse of the Soviet Union, military importance or value of the Arctic reduced to an all-time low.

This began to change when it became clear that the Arctic and the changing geophysical environment would expose significant economic incentives. Unfortunately, before re-investing of the military in the Arctic occurred, the Global War on Terror gained momentum and the Arctic remained a secondary theatre for most nations. SOF units that would normally maintain currency in Arctic warfare now had to refocus their efforts; consequently, Arctic capabilities were lost.

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345 Kraska, *Arctic Security in an Age of Climate Change*, xxcii.

346 O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, 60.

Experts on the Arctic, however, know that Arctic strategic military significance has increased in the last decade. Recent renewed military activity of most Arctic nations in the region, confirms this statement. Especially Russia has increased its military presence in the region by stepping up its military exercises, strengthening its Northern Fleet, opening new military bases, and building more nuclear icebreakers. While this emphasis on Russia does not indicate that Russia is to blame for possibly reducing the cooperation element in the Arctic region, it is necessary to keep in mind that the Russian side of the Arctic is changing; the sea ice is melting faster than on the European and North American side. Also, Russia is, as mentioned previously, highly reliant on the natural resources to be exposed in the Arctic. Thus, Russian Arctic behavior is not surprising, nor unfounded. It is, however, necessary to prepare for and deal with this behavior. In a recent interview with students at a university, Putin stated, "the Arctic plays an important role in terms of Russia's security because of the fact that the United States has concentrated nuclear attack submarines of the coast of Norway, able to hit Moscow in 15 to 16 minutes."[347] In a recent speech by the NATO secretary general, he stated, in relation to the Arctic, that "a firm and determined deterrence is the best way to facilitate peaceful, diplomatic and political processes."[348] Together with the spillover effect of present conflicts in other regions in the world, it seems that the classic Cold War paradigm is looming at the horizon. In fact, currently "Russia views NATO as an opposition not a partner."[349]

All this shows how military power, as a consequence of increased economic interest, may follow suit in a traditional fashion. With increasing and conflicting national interests in the Arctic the elements of national power will follow. However, there are no indications that a large conflict involving the military is waiting to happen in the future Arctic region. The takeaway is that SOF must be able to cover operations on the full

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347 Mia Bennett, "Putin's Territories: From Crimea to Chukotka," *Cryopolitics, Arctic News and Analysis,* September 5, 2014, http://cryopolitics.com/2014/09/05/putins-territories-from-crimea-to-chukotka/.

348 Anders Fogh Rasmussen, NATO Secretary General, "America, Europe and the Pacific."

349 Keld Vrå Andersen, "Fogh: Russia Views Us as an Opponent," TV-2 Nyhedscenter, September 1, 2014, http://nyhederne.tv2.dk/udland/2014-09-01-fogh-rusland-betragter-os-som-en-modstander.

spectrum of conflict. When in the beginning of 2014 the thought of any significant conflict between Russia and NATO was unthinkable, reality has once again surpassed wishful thinking and shown how we must prepare for probable contingencies.

The previous chapters also point out that, although four out of five Arctic littoral states are NATO members, there seems to be no consensus on how the alliance should play a role in the region. This has a hampering effect on joint training and exercises as an alliance in the Arctic region. This also sends a signal to Russia, giving Russia more "room to maneuver" in the Arctic. If the role of NATO remains uncertain in the Arctic Region, individual nations will have to establish separate military bilateral agreements. There is only one nation that will benefit from this, and that is Russia. Furthermore, Russia is augmenting its Arctic capabilities and infrastructure by, among others, reactivating 12 Cold War era airbases.[350] "Russia got more land, coastline, and waters than any other nation,"[351] and—along with the previously mentioned SOF—can "through the infrastructure improvement, … project … a combined arms operation to an extent that the other Arctic nations cannot."[352] So what does this mean for SOF? It depends on how the Russian actions are perceived by the other Arctic stakeholders within, but also outside, of the Arctic. And, while the Russian application of military SOF—and other military force—may or may not affect U.S. focus on Arctic strategy, it is equally interesting to consider the place this puts Norway and Denmark in, where the Russian stance and overwhelming Arctic force might be perceived as going beyond merely protecting economic interests and dominating the perspective of these bordering small states. This, in turn, will call for NATO support in the Arctic, leading back to Cold War structures in security policy. Norway and Denmark are indeed adapting their Arctic capabilities with an increased strategic focus—in pursuit of own economic interest according to their Arctic strategies—by reorganizing and building ice-strengthened ships.[353]

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350 Dr. Dylan Lehrke, "The Cold Thaw," *Jane's Defense Weekly*, May 14, 2014, 28.

351 Ibid., 27.

352 Ibid., 28.

353 Lehrke, "The Cold Thaw," 28–29.

Arctic military collaboration and integration is still in its infancy. Because of this, SOF has to rely on national C2 in order to be effective. There is much to harvest and gain from partner nations, which have maintained Arctic SOF capabilities because of geopolitical obligations remaining after the Cold War and throughout the Global War on Terror. Why do most scenarios used in the Arctic Exercises still have a very conventional focus especially when knowing that future Arctic conflict is likely to have an irregular focus—involving a large number of stakeholders?

There is an important consideration when discussing military employment in the Arctic region and that is the issue of presence versus preparedness; if it is not politically or economically feasible to maintain a constant military presence in the Arctic as a contingency force—due to political sensitivity, but also because of limited resources and associated strategic balancing—then the ability to deploy to the Arctic becomes an issue on its own. A large conventional force is less adept at responding quickly to case-by-case contingencies compared to SOF. Furthermore, SOF are also easier to sustain compared to their conventional counterpart. In short, SOF are distinguished by the ability to respond quickly. SOF can maintain a "small foot print" in respect to strategic deployment and tactical employment under strict and direct political guidance. SOF's responsiveness and relative ease of sustainment are two of the most important features seen from an Arctic perspective. As such, SOF is particularly suited to responding to security issues in the full spectrum of conflict within the complex and hazardous Arctic environment.

As described in Chapter III, especially the current Arctic SOF capabilities of the United States fall short of the current increasing requirements. It is fair to say that, in general, SOF have become less capable to operate in an area that is becoming increasingly important. However, Denmark and also the Netherlands have been able to maintain a level of proficiency for operating in the Arctic. This highlights the importance of collaboration—where the United States can harvest experience from smaller stakeholders, such as Denmark and the Netherlands—towards establishing a robust Arctic SOF capability enabling A4 and NATO security cooperation in the Arctic.

4. Economic Power

Most of the strategic ramifications directly result from the economic incentives of the changing Arctic environment. First and foremost, what follows is that new lucrative avenues open up and there will be an increase in commercial traffic. The sea ice is melting faster at the Russian side of the Arctic than anywhere else. As a consequence, the NSR will open before the NWP. Where legal trade goes, illicit trade and contraband are likely to follow. Given the remoteness and lack of governance and infrastructure, "Arctic Piracy" could be a lucrative business model. This may result in utilizing SOF assets, in combination with OGAs, to counter these illegal activities. As said before, the tyranny of distance in combination with the limited infrastructure and governance will most likely exacerbate this problem of countering these threats. Second, where trade routes open, tourism in general will also increase; an increase of cruise liners is already a reality in the Arctic.

What logically follows is that, however small the threat of a cruise ship being hijacked, this risk goes up, as well. Given the fact that an HRO is always an extremely difficult operation to execute, the tyranny of distance and environmental issues will also exacerbate the problem. Third, the number of oilrigs north of Norway, Russia, and around Alaska goes up. These platforms could be lucrative targets for either criminals or terrorists. Recently Putin addressed how Russia will employ SOF[354] to protect their Arctic offshore oilrigs against terrorists and other security threats. Although doctrinally SOF are not the force of choice for a static point defense of oilrigs as proposed by Putin, responding to an MCT threat in the Arctic is a probable contingency and should be exercised accordingly. As a final point, more economic activity overall in the Arctic region will automatically increase the physical involvement of different environmental

354 Atle Staalesen, "Putin Arms Arctic Drillers," Barentsobserver, April 23, 2014, http://barentsobserver.com/en/security/2014/04/putin-arms-arctic-drillers-23-04.

groups. The best recent examples are the confrontation between Greenpeace and Russia, and the Sea Shepherd Conservation Society and Denmark (Faroe Islands).[355]

B. OBSERVER NATIONS

Earlier in the chapter the strategic ramifications for the Arctic nations were summarized using DIME. This section describes the strategic ramifications for the observer nations and "other" organizations.

The Arctic region is gaining importance to both upcoming and established economies in Asia, North America, and Europe. Most of these economies are non-arctic nations with observer status in the Arctic Council. In 2013, the Arctic council had the most new observer nations join, since it has been established in 1996.[356] This by itself is a clear signal of the increased political importance of the Arctic region. In 2014, nine of the top ten world economies are either Arctic Council members or observers. Of the top 20 economies, only five are neither member nor observer nations. From this it appears the Arctic is becoming an important region receiving significant attention from the majority of the world's greatest economies.

Non-Arctic states are motivated to a considerable degree by the attractions of exploiting the Arctic's natural resources and of taking advantage of opportunities for commercial shipping in the region.[357] Three things calls for further attention towards this growing interest: (1) under the terms of UNCLOS, non-Arctic states have a right to engage in a range of activities in the Arctic basin, referred to as "The Area." With the geophysical change, the melting sea ice, those activities will increase; (2) incentives of Arctic states to enter into cooperative engagements with non-arctic states, such as Chinese investments in Iceland and Greenland, are good examples;[358] and (3) the shifts

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355 Seashepherd.org, "Sea Shepherd Crewmembers Arrested for Intervening against Brutal Faroese Pilot Whale 'Grind' Hunt," August 30, 2014, http://www.seashepherd.org/news-and-media/2014/08/30/sea-shepherd-crewmembers-arrested-for-intervening-against-brutal-faroese-pilot-whale-grind-hunt-1617.

356 In May 2013 six new observer nations joined the Arctic Council: China, India, Italy, Japan, Singapore, and South Korea.

357 Kraska, *Arctic Security in an Age of Climate Change*, xxiv.

358 Ibid..

and posture changes that are taking place in the broader landscape of global politics with claims such as The United States is no longer the undisputed hegemon in world affairs.[359]

C. OTHER ORGANIZATIONS

The distribution of power in global politics seems to be contested. With international relations still dominated by the nation states involved, nations will continue to look after national interests.[360] Nation-states will do so by utilizing their national elements of power. However, a sizable number of future arctic stakeholders will be "other organizations" as well. Examples of such organizations are non-governmental organizations including environmental organizations like Greenpeace, and multinational corporations such as BP, ExxonMobil and Shell, as well as major shipping companies. Especially multinational corporations have emerged as major players in the landscape of the Arctic region, and have economies that rival those of all but the largest states.[361]

As discussed before, the geophysical and political changes are indicating an increase in the number of these other organizations. New Arctic specific alliances will possibly be formed between states, non-states, and other stakeholders. Multinational corporations are already investing in critical Arctic infrastructure of several Arctic nations thereby becoming an integral and essential part of the Arctic future by creating dependence. These same corporations, forward positioned in the Arctic with critical capabilities like rotary and fixed wing assets, are helping out during time of crises. A last consequence worth mentioning is the increase in conflicts between NGOs and states, such as the 2013 incident involving Russia and Greenpeace. The boarding by Russian military personnel of the Dutch flagged Greenpeace ship Arctic sunrise outside Russian territorial waters was a clear signal to the rest of the world that Russia will defend its territory using military means, and is prepared to challenge international law in doing so.

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[359] Ibid.

[360] Ibid.

[361] Ibid., xxv.

It seems that the evolution in the Arctic may foster dependence on non-state Arctic stakeholders. Cooperation between nation-states and non-state Arctic stakeholders as well as possible problems where interests conflict also seems likely. The military element of DIME should prepare to work with and through these other organizations in pursuit of national interests and secure Arctic Governance.

V. SECURITY THREATS

The previous chapters described the current geophysical, political, and military environment. The conclusions up to this point explain to the reader that there is a likely increased requirement in the Arctic region for military in general, and SOF, in particular.

In this chapter three historical analogies show how a lack of specific capabilities, skills and binding agreements such as aAAR, SOF airmobile preparedness, and bi- or multinational agreements could influence an operation. Parallels can be drawn from these historical analogies to possible future contingencies in the Arctic region. A selection of future contingencies, form the basis for the six vignettes in the second part of this chapter and will "paint the picture" of what could be a future situation for SOF involvement in the Arctic. These vignettes show a probable future for SOF on the whole spectrum of conflict, ranging from CP to SAR/DR missions.

A. HISTORICAL ANALOGIES

This segment describes three historical cases where various types of capability shortfalls (ranging from tactical skills to strategic coalitions) had significant influence on mission success. In the case of the SAR scenario, a lack of an AAR capability resulted in the rescue force not being able to execute the mission as a result of insufficient range. In the *Achille Lauro* incident, a political sensitivity and conflicting national interests left the United States alone on the mission. In the Eagle Claw mission, a complex mix of a lack of skills, training, jointness, and equipment malfunction led to failure. There is no reason to believe the Arctic environment will be more forgiving of these shortfalls in future SOF missions.

The geophysical environment in the Arctic does pose unique challenges and simply overlaying current SOF capabilities is indeed not a viable approach; the weather in the Arctic requires specific skills, training, and equipment to include mobility assets (strategic through tactical level). Cooperation in a multinational and multiagency context will also be crucial in the future in the Arctic. While the selected vignettes in this study are not predictions, they are merely probable and vetted through these historical events.

Therefore, they provide empirical knowledge on how to prepare, and equally important, how not to. In other words, the historic analogies serve as historically educated guesswork, thereby maximizing their value in shaping the future for SOF in the Arctic.[362] There are several other historical analogies to choose from other than the ones laid out in the following subsections, e.g., the recent counter-piracy effort in the Gulf of Aden, where a multinational effort protects commercial shipping.

1. Canadian Search and Rescue in the North Atlantic

Canada possesses an elite SAR capability, The Canadian Armed Forces Search and Rescue (CAFSAR). In spite of this,

> In December of 1994, a nor'easter sank the 450 foot motor vessel Salvador Allende in the North Atlantic. Onboard the Ukrainian registered freighter were 31 crewmembers who were left stranded, battling for survival against 30 foot seas and 60 mile per hour winds. The crew members were hundreds of miles away from land and the magnitude of the storm that sank the Salvador Allende prevented other ships from reaching the scene. Although Canadian and American search and rescue planes had been able to locate survivors in the water and drop life rafts, a rescue would only have been possible by helicopter. Due to the distance from land, this mission was outside the boundaries of conventional search and rescue and would require a special type of helicopter, one that was capable of aerial refueling.[363]

This is not the only incident where SAR missions went wrong.[364] However, the incident points out an essential capability gap, and there are several aspects of this rescue attempt that are interesting to analyze. Most obvious is the explicit mention that the lack of AAR capability was critical, and prevented the *conventional* SAR mission from overcoming the *tyranny of distance* prevalent in the Arctic. AAR is a typical SOF

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362 Colin S. Gray, "How Has War Changed Since the End of the Cold War?" *Parameters* 35, no 1 (2005): 16.

363 Brad McNally, "Helicopter In-Flight Refueling," justhelicopters.com, March 29, 2013, http://www.justhelicopters.com/ArticlesNews/CommunityArticles/tabid/433/Article/67520/Helicopter-In-Flight-Refueling.aspx.

364 While the Salvador Allende incident shows how inadequate range resulted in mission failure, a more recent SAR mission shows how inadequate helicopter response time resulted in the death of a SAR tech. Source: Bruce Campion Smith, "How Did a Search-and-Rescue Mission to Igloolik Go Wrong?" *Toronto Star*, April 20, 2012.

airmobile characteristic because of the often-extended range required for SOF, compared to conventional forces. A second incidental, but even more interesting aspect, is the fact that the vessel was Ukrainian registered. Russia and Ukraine are amidst the biggest crisis in Europe since the height of the Cold War. Previous comments in the study address the negative effect this has on NATO and Russian cooperation, which is non-existent. Thus, the question remains, to what extent will Russia offer support in rescuing a Ukrainian vessel if it is not clearly within well-defined Russian boundaries? And, to what degree will Russia seek to exploit such a mission in support of other goals in other theaters? To what degree will Russia be willing to cooperate? Finally, how will a lack of cooperation affect the ability to conduct SAR, or other mission types, in a multinational context between Russia and the other Arctic nations? While it is uncertain what the answers to those questions are, that uncertainty precisely underscores the necessity of establishing frameworks for more secure cooperation—and binding agreements—with established partners.

The important takeaway from the previous SAR scenario, shows how mobility, range, and response time are crucial in an Arctic environment when responding to time-critical tasks, which unlike the Mediterranean, the Persian Gulf, the Gulf of Aden, or even the cooler Pacific, does not accommodate humans exposed to the elements very well. These concerns do not relate only to SAR. What if a ship instead of capsizing was attacked by terrorists, and held in the Arctic sea within Danish or Norwegian territory? What if a vessel was captured by alleged Russian-supported Ukrainian rebels, claiming they have seized an illicit arms transport? Some of the hostages might even be Dutch like in the recent Russian raid on the Dutch-registered Greenpeace vessel in international Arctic waters. The combination of the Arctic geophysical and geopolitical environment may preclude Russian involvement in an HRO on a Ukrainian vessel, or another vessel where either country of origin, corporation/NGO, or purpose of presence will conflict with Russian national interests. Though such a scenario is hypothetical, it is probable and

historically founded through the Achille Lauro HRO on a cruise ship in the Mediterranean.[365]

2. *Achille Lauro* Hostage Rescue Operation

Just like in the Arctic where political issues and relations inside and outside of the Arctic are intertwined, the Achille Lauro was incidental and a result of a dispute between Israel and the Palestine Liberation Front,[366] and as such had nothing to do with the passengers, the cruise ship, or its country of origin. The response and lack of coalition support in the HRO was a result of affairs and politics not directly related to the event either. Just as the Ukraine-Russia crisis has nothing to do with the Arctic, yet it still impacts Arctic cooperation. Furthermore, established international relations were severely tested by the *Achille Lauro* incident, as national interest took precedence over willingness to partake in freeing the hostages and capturing the perpetrators. Though the ad hoc response was successful, two issues are relevant to point out. First, "the mission made innovative use of available conventional force capabilities to perform a type of task normally handled by Special operations units."[367] The Arctic geophysical environment and limited force availability in the region might possibly preclude such an approach. Second, "the Achille Lauro incident underscored once more that even the best international friends have unique interests and constraints."[368] The Arctic geopolitical environment is also very sensitive with arguably even greater stakes at play among global and regional powers intertwined amid small states and trusted partners trying to navigate between national interests and Arctic security politics. Again highlighting the fact the Arctic environment, in its broadest sense, calls for preparation and application of SOF.

When the Arctic sea, by definition, reaches the status of ice-free, there will still be 1,000,000 square kilometers or less of sea ice remaining. This area corresponds to an area

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365 For further information regarding this incident, see: Daniel P. Bolger, *Americans at War, 1975–1986: An Era of Violent Peace* (Novato, CA: Presidio, 1988), 360–381.

366 Bolger, *Americans at War, 1975–1986: An Era of Violent Peace*, 362.

367 Ibid., 377.

368 Ibid., 379.

roughly the size of France and Germany combined.[369] This not only shows the size of the Arctic, which is slightly less than 1.5 times the size of the U.S.,"[370] but more important, how it relates to other maritime areas where SOF has previously conducted operations, such as in the Mediterranean or the Persian Gulf. Therefore, it is not possible simply to apply overlays from historical events and expect the experience gained from previous successes will suffice. The description of the next historical event shows how—even provided time to prepare[371]—ad hoc forces when sufficiently challenged by the theater of operations, e.g., large distances, hazardous and unfamiliar terrain, and weather—in combination with a lack of joint training and exercise as well as equipment failure—can result in disaster. Furthermore, aircrew personnel lack of a sense of purpose, skills, and confidence in the mission may also have critical impact on the outcome. "The pilots were being asked to do things they had never tried."[372]

3. Operation Eagle Claw

In 1980, operation Eagle Claw failed and several of the involved personnel died. Eagle Claw has been studied in great detail. The following is not an elaborate study of that mission; it is merely a highlight of some of the key points, which are not merely relevant and able to be transposed into the Arctic region, but might likely be exaggerated when doing so. Therefore, the lessons learned from Eagle Claw must be observed when preparing SOF to operate in the Arctic. The objective in operation Eagle Claw was to free the hostages held at the U.S. embassy in Tehran. After a few weeks of preparation, "Delta was basically ready to storm the compound, but the problem of delivering them and getting them out remained."[373] These issues were apparently never resolved; when the

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[369] France is 643,801 km^2, Germany is 357,022 km^2, totaling 1,000,823 km^2 in combination. Source: Central Intelligence Agency, CIA, "The World Factbook," https://www.cia.gov/library/publications/the-world-factbook/.

[370] Central Intelligence Agency, "The World Factbook," https://www.cia.gov/library/publications/the-world-factbook/geos/xq.html.

[371] The rescue force had been preparing for the mission since early November to late April. Source: Mark Bowden, *Guests of the Ayatollah: The Iran Hostage Crisis: The First Battle in America's War with Militant Islam* (New York: Grove Press, 2007).

[372] Ibid., 343.

[373] Bowden, *Guests of the Ayatollah: The Iran Hostage Crisis: The First Battle in America's War with Militant Islam*, 226.

force infiltrated towards the refueling and staging area, Desert One—as part of an 850 nm penetration into Iranian territory[374]—things went awry.

The rescue force never reached the objective in Tehran. The eight Sea Stallions soon became six. "Two of the helicopters had problems with their navigation equipment, but flying that close [200 feet] to the ground they could steer by landmarks."[375] As it turned out, later in the flight that was a risky technique at night, using night vision goggles in the desert. Soon the helicopters found themselves in a dust storm, a *Haboob*, eliminating the ability to fly using visual cues. The helicopter crews did not have any information about these weather conditions, and hence, did not alter their flight profile. Only the C-130 crews had spotted the storms when flying over them, but radio silence requirements prevented the C-130 crews' effort to relay this information to the helicopters. These same conditions with reduced visual cues are prevalent in the Arctic desert as well, as discussed previously. Solely relying on visual cues under these conditions is not a safe option, setting forth requirements towards increased redundancy in navigation capability. The pilots' attempt, with some success, to out-climb the dust storms in order to ensure separation from the mountains in the desert visually, as they did not trust the machine or their map.[376] The failure of a hydraulic system in one of the helicopters eventually caused the mission to be aborted. Later the inability to maneuver safely in Desert One, because of brownout conditions, resulted in a disaster where a Sea Stallion crashed into a C-130, killing several U.S. troops.

The study on the meteorological conditions in the Arctic shows that challenges of the same character exist in the Arctic. Clouds and whiteout conditions are more a rule than an exception in the Arctic. Out-climbing clouds to regain visual conditions may not be possible due to icing, and certainly will not be possible in those areas of the Arctic region where Nimbus stratus clouds prevail. While maneuvering close to the ground, drifting or blowing snow along with moderate or poor visibility in fog creates conditions similar to those experienced in Desert One; except in the Arctic it is such a widespread

374 Ibid., 230.

375 Ibid., 447.

376 Ibid., 449.

phenomenon, it is referred to as Arctic whiteout. The Artic also poses challenges to communication; maintaining situational awareness and command and control may also be challenging not just because of operational security, but also because of Arctic geophysical conditions degrading conventional means of communication. The uncertainty of the Arctic weather, like in the Iranian desert, also sets forth increased requirements towards equipment, training, skills and not least a mindset, which ensures an understanding of the mission.[377] One final comment, which has not been mentioned yet is jointness. Though the different services were all represented in operation Eagle Claw, the mission was not joint. There are several indications that Delta Force "was the mission,"[378] and that the other elements were just supporting, and doing a poor job at it. This might have been true, but the best way to overcome this would have been through training, ensuring interoperability and a true sense of jointness. This is also a key takeaway in the Arctic region where multinational SOF may have to collaborate. In order to do this effectively requires interoperability and acceptance of all the elements of the force. This recognition is only achieved through training and networking.

Eagle Claw did not fail because of incompetent aircrews; it failed because a SOF mission was attempted using a force that was not prepared to do it. The ad hoc force did the not have the readiness, which is an inherent part of SOF as laid out in the discussion on SOF doctrine. The Geophysical environment in the Arctic almost certainly dictates that the same lack of readiness will also result in failure there. Another important reason why Eagle Claw failed was the lack of jointness, the lack of understanding of the different roles of the various players. Though speculative, this understanding may have enabled identifying the biggest hurdles in the mission, getting there and getting out again, which in turn may have resulted in a completely different concept of operation. The geopolitical environment in the Arctic shows how vastly different units may have to cooperate as was the case—with the different U.S. services—in Eagle Claw, however, this time in a multinational context. Only by creating a solid foundation, a network, of

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377 One of the helicopters turned back, not knowing that decision would "…fatally compromise the mission." Source: Mark Bowden, *Guests of the Ayatollah: The Iran Hostage Crisis: The First Battle in America's War with Militant Islam*, 450.

378 Ibid., 451, 453.

interoperability through understanding, acceptance, and training will success be within reach in future Arctic SOF missions.

B. ARCTIC VIGNETTES

As already mentioned in Chapter I, this thesis uses vignettes—derived from the geophysical and geopolitical analysis—instead of scenarios. Scenarios are typically viewed as official higher-level storylines at the strategic level, serving as contingencies for defense planning. Vignettes, on the other hand, are not officially approved, and allow some more flexibility, yet are nested within a higher-level scenario.[379]

When considering what to prepare for in the future Arctic region, it is interesting to see what contingencies a country like Russia is preparing its military forces for in the Arctic region. Open source information reveals three possible scenarios: (1) U.S. attack submarine threat in the Arctic region,[380] (2) countering incoming (cruise) missiles traveling through the Arctic region;[381] and (3) protecting its oilrigs against a potential terrorist threat.[382] It seems that Russia is focused on a more conventional threat, or at least uses this "threat" to justify its military buildup in the region.

For this thesis six vignettes are developed, covering the full spectrum of conflict and ranging from peacetime to war. These vignettes include operations that are likely to require SOF resources, although this is slightly different among the three countries studied here. Every vignette can be viewed as a specific military problem from which a

379 Gongora, "Scoping Missions and Tasks for CANSOFCOM in the Canadian North," 10.

380 In an interview with Russian president Putin, he highlighted the need for enhanced national security engagements in the Arctic region. Putin stated that U.S. attack submarines are concentrated there, not far from the Norwegian coast, with missiles which can reach Moscow in 15–16 minutes." Source: Atle Staalesen, "Missiles and Manpower for a New Artic Base," *Barentsobserver*, September 1, 2014, http://barentsobserver.com/en/security/2014/09/missiles-and-manpower-new-arctic-base-01-09.

381 The First large live-fire exercise as North as 76°N in Post-Soviet times with vessels from Russia's Northern fleet involved downing of a cruise missile. "According to the scenario of the exercises, units of the tactical group, acting in coordination with the ship unit, fought to repel aerial attacks by an imaginary adversary and fired at simulated targets. Source: Thomas Nilsen, "Itar-Tass posts Arctic war games video," Barentsobserver, September 23, 2014, http://barentsobserver.com/en/security/2014/09/itar-tass-posts-arctic-war-games-video-23-09.

382 Atle Staalesen, "Putin Arms Arctic Drillers," April 23, 2014, Barentsobserver, http://barentsobserver.com/en/security/2014/04/putin-arms-arctic-drillers-23-04.

staff can start a CBA in order to go from scenarios to capabilities.[383] The vignettes can also be utilized as a starting point for a mission analysis or a war game. Regardless of how the vignettes are used, they will inevitably lead to shortfalls and additional requirements for SOF units, in order to be able to achieve future mission success. A summary of analysis is given in Table 2.

1. Vignette 1 – Counter Proliferation (CP)

Open-source intelligence suggests the smuggling of a nuclear device into North America through the Canadian North is a recognized threat.[384] The specific vignette involves smuggling of a small nuclear device into North America through Churchill, Manitoba, Canada's only inland seaport with access to the Arctic Ocean.[385] First and foremost, this threat poses significant danger to both Canada and the United States, making it a national and continental defense concern. Additionally, this vignette depends greatly on when the nuclear device is detected. In Gary Rice's account, the bomb is accidentally detonated in Churchill, Manitoba, creating a crisis response scenario with a nuclear nexus.[386] The presence of non-state actors will be of increasing concern as the Arctic Ocean continues to open to increased maritime traffic. M. Bunn and A. Wier, in "The Seven Myths of Nuclear Terrorism," argue that it is highly plausible for a terrorist group to either steal a nuclear bomb, or acquire the necessary materials and directions to make one.[387] The nuclear device smuggling vignette is therefore a relevant threat that offers unique challenges to Special Operations Forces.

In this vignette, intelligence indicates that there is a nuclear device on a fishing trawler in transit during late spring through the Canadian Arctic. It is sailing into and out of international and domestic Canadian waters, probably heading for Churchill,

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383 United States Joint Chiefs of Staff J-8, *Capabilities-Based Assessment User's Guide*, version 3, 38.

384 Gary Rice, "Four Selected Intrusion Scenarios," Chapter 5 in *Defence Requirements for Canada's Arctic,* Brian MacDonald, ed. (Ottawa: The Conference of Defence Associations Institute), 65–78.

385 Ibid.

386 Ibid.

387 M. Bunn and A. Wier, The Seven Myths of Nuclear Terrorism. *Current History* 104, no. 681 (2005): 153–161, http://search.proquest.com/docview/60705360?accountid=12702.

Manitoba. The challenge here is to keep tracking the trawler and coordinate the interception, given the environmental and infrastructural challenges.

2. Vignette 2 – Hostage Rescue Operation (HRO)

Another hypothetical but probable vignette in the future Arctic, likely involving SOF, is a hostage situation on a ship or cruise liner. The retreating ice is already triggering an increase in the number of ships in the Arctic.[388] Although "Somalia-like" Arctic piracy seems unlikely, the stealing of cargo as is done currently by criminals in the Gulf of Guinea could very well be a future business model for organized crime along the Arctic sea routes (NWP, North Pole Route, and especially the NSR). For the same obvious reasons, polar tourism is likely to continue in the near future. A hostage rescue vignette, involving a cruise ship, could become reality not only for Arctic littoral states, but also for non-Arctic states like the Netherlands. Who and how to respond to such a scenario depends on the geographic position of the ship and its flag state, but will undoubtedly involve specific military hardware and capabilities.

In this vignette, a cruise ship in transit on the high seas from Svalbard to Scoresby Sund, Greenland, is hijacked by a radical environmental terrorist group. Their demand to the governments of Norway and Denmark is to stop Arctic exploration immediately and to free three group members who are imprisoned in Norway. They threaten to sink the ship with a total of more than 200 passengers and crewmembers on board if their demands are not met. The ship, with a 1A ice-rated hull, is sailing through an area with lots of floating sea ice. The ship is flagged in the Bahamas and the passengers on board are mostly British and Dutch. The challenge here is to coordinate a complex HRO again given the floating sea ice environment and limited infrastructure in the area. Also, the multinational and governmental character and involvement of this vignette plays a role here.

388 In 2013 there has been a 54 percent increase in the number of ships that used the NSR. "New Advisory for Navigating the Northern Sea Route," Barentsobserver, January 31, 2014, www.barentsobserver.com.

3. Vignette 3 – Maritime Counter Terrorism (MCT)

Another potential vignette for the future Arctic region is the likelihood of MCT.[389] With an increase of oil platforms in the Arctic region in the years to come MCT is one of the contingencies to be prepared for. Because of their isolation and distance from shore/infrastructure, offshore platforms are extremely vulnerable to attack,[390] and when occupied by potential terrorists, can be used as a powerful bargaining tool. Currently, a lot of oilrigs are being developed; therefore, the number of platforms is likely to increase drastically in the years to come. This raises concerns in terms of security. Acknowledging this potential threat, Russia recently announced that it will allow its oilrigs to use armed guards for protection, and in addition will use its SOF to increase security.[391]

For this specific vignette, an oilrig of Royal Dutch Shell in the Chukchi Sea has been captured by an unknown terrorist organization. An incoming relief helicopter took small arms fire from the oilrig and observed armed men on the platform. Although no contact has been established so far, intelligence claims the aim of this terrorist organization is to make the United States "pay" for their recent military intervention in a Middle East country. It is believed this group will try to blow up the oilrig, thereby causing an environmental disaster in this part of the Arctic.

4. Vignette 4 – Search And Rescue (SAR)

Because of the increase of activities in the Arctic region, the demand on SAR is likely to increase as well in the near future. Since 2011, a SAR agreement has been in

389 *Maritime terrorism* refers to the undertaking of terrorist acts and activities (1) within the maritime environment, (2) using or against vessels or fixed platforms at sea or in port, or against any one of their passengers or personnel, (3) against coastal facilities or settlements, including tourists resorts, port area's port towns or cities. Source: Peter Chalk, *The Maritime Dimension of International Security: Terrorism, Piracy, and Challenges for the United States*, Vol. 697 (Santa Monica, CA: Rand Corporation, 2008), 3.

390 Assaf Harel, "Preventing Terrorist Attacks on Offshore Platforms: Do States Have Sufficient Legal Tools?" *Harvard National Security Journal* 4 (January 2013): 132.

391 Staalese, "Putin Arms Arctic Drillers."

place between the Arctic states.[392] This agreement assigns each member an area for which it is responsible for SAR. This increased responsibility places greater demands on the individual nation's SAR capability, while also calling for more cooperation among the Arctic states.[393] Furthermore, SAR is a very complex operation and requires special equipment and specially trained personnel, especially when conducted in the Arctic region, where *conventional* SAR previously has failed. Though SAR is not a typical SOF mission, smaller Arctic nations like Denmark may seek to use their scarce resources and established Arctic SOF capabilities to execute this type of mission. A SAR operation in the Arctic will be a challenge regardless if it is a sinking ship, a vessel lodged in the ice, or a crashed airplane on land or ice.

In this vignette a Chinese submarine ten miles off the coast of Greenland has sustained serious damage from floating ice and is unable to reach the nearest port of Upernavik, Greenland. Local fishermen have reported the submarine, and a distress signal has been intercepted by RCC as well. Although embarrassed by this incident, the Chinese authorities asked Denmark and Canada to help rescue the 85 Chinese submariners. This vignette offers several unique challenges, to include interagency and multinational coordination, command and control, and SAR specific training and equipment. It is therefore relevant to all states with territory in the High North.

5. Vignette 5 – Strategic Reconnaissance & Surveillance (SR&S)

This thesis argues that, although chances are small, future state-on-state conflict in the Arctic cannot be ruled out for two reasons: first, because of the spillover effect from other conflicts or theatres in the world into the Arctic region; second, because of the increasing accessibility to the vast amount of resources in the region. SR&S is one of the principal SOF tasks.

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392 The "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic" was signed by the eight Arctic States (Canada, Denmark, Finland, Iceland, Norway, Russia, and Sweden) on May 12, 2011, in Nuuk, Greenland.

393 International Federation of Red Cross and Red Crescent Societies, "Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic."

This vignette takes place on Svalbard, a unique Archipelago in the Arctic Ocean. Part of what makes Svalbard unique is the Svalbard Treaty,[394] signed in 1920, allowing signees specific privileges on the Islands. Local HUMINT indicates Russia is using its research center in Svalbard as a Forward Operating Base to conduct clandestine military activities. Since other ISR assets are not able to provide confirmation on the HUMINT, Norwegian SOF is tasked to conduct an SR mission and get eyes on the research center. This vignette offers a "classic" SOF operation in a demanding environment, including the political sensitivity and strategic importance as part of the Arctic geopolitical environment.

6. Vignette 6 – Arctic Security Force Assistance (SFA)

It is 2050, and Greenland is enjoying an increasing foreign interest of predominant Asian countries due to the increasing scarce natural resources found on its territory. As a result, for many years there has been a large influx of foreign workers.[395] There is, however, a lack of integration of these workers with the local—predominant—Inuit population and the weak local and national government. As seen throughout history, "often countries with weak governance and abundant natural resources are prone to armed violence"[396] possibly compromising human rights, law enforcement, and

394 The Svalbard Treaty has been signed by 39 countries and recognizes the sovereignty of Norway over the Arctic Archipelago, at the time called Spitsbergen. The exercise of sovereignty is, however, subject to certain stipulations, and not all Norwegian law applies. The treaty regulates the demilitarization of the archipelago. Article 9 prohibits naval bases and fortifications to be build, and also the use of Svalbard for war-like purposes. The signatories were given equal rights to engage in commercial activities on the island. As of 2012 Russia is making use of this right and as of 2013, they have established a research center. Source: Governor of Svalbard: The Svalbard Treaty, last updated April 9, 2008, http://oldweb.sysselmannen.no/hovedEnkel.aspx?m=45301.

395 Kraska, *Arctic Security in an Age of Climate Change*, 134.

396 The future for the Greenlandic Arctic appears to have similar trades to Africa in terms of natural resource exploitation, and the African *resource curse* may appear as an Arctic resource curse in the future. For further see, Terra Lawson-Remer and Joshua Greenstein, "Beating the Resource Curse in Africa: A Global Effort," Council on Foreign Relations, August 2012, http://www.cfr.org/africa-sub-saharan/beating-resource-curse-africa-global-effort/p28780.

population control, border security, executive authority, and protection of the political process.[397]

In this vignette intelligence indicates that the immigrants are building their own enclaves and are supported by Asian state actors support; they even have set up their own legal system, including a paramilitary guard. The total estimated foreign workers in 2050 already equals the total local Greenland population of 70,000[398] and threatens to destabilize Greenland society. In order to prevent current developments to evolve into an insurgency, the Greenlandic-Danish government requests security assistance from NATO partners.

This vignette describes a potential future SFA[399] or MA mission to support the local security forces of Greenland. Given the developments in the Arctic region, an SFA/MA mission seems plausible and could be relevant in the future. Given the type of mission it is likely that SOF will be involved.

C. ANALYSIS OF VIGNETTES

The final part of this chapter provides an analysis of the six vignettes. In Table 2 each vignette is analyzed by looking at considerations or attributes that could be insightful when predicting a future employment of SOF in the Arctic region.

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397 These elements are taken from "Best Practices in Counterinsurgency." This article provides a concise description of key elements required to succeed in counterinsurgency, thus they are important to focus on in this hypothetical vignette. For further information, see: Kalev I. Sepp, "Best Practices in Counterinsurgency," Naval Postgraduate School, Monterey, CA, Department of National Security Affairs, 2005.

398 The 70,000 is a hypothetical number based on the Greenland population of about 58,000 people, 89 percent Inuit and 11 percent Danish, in 2014. Source: Central Intelligence Agency, "The World Factbook: Greenland."

399 SFA is terminology used in U.S. SOF doctrine that would translate into Military Assistance (MA) according to NATO doctrine.

Table 2. Overview of vignette analysis.

	Task	Season	Environment	Mobility	Cooperation	Critical capabilities
1- CP	AA/CA	Summer	Maritime/Land	**Land:** Range / Access **Sea:** Access **Air:** Range	IDC/OGA Bi-national GSN	C4I
2- HRO	AA/CA	Summer	Maritime	**Sea:** Access / Response time **Air:** Range	IDC/OGA Multinational GSN	C4I MDA AAR Ice strengthened vessels
3- MCT	AA/CA	All Seasons	Maritime	**Sea:** Access / Response time **Air:** Range	IDC/OGA Multinational GSN	C4I MDA AAR
4- SAR	None	All Seasons	Maritime	**Sea:** Access / Response time **Air:** Range	IDC/OGA Multinational	C4I/MDA/ AAR
5- SR	PT/CA	All Seasons	Land	**Land:** Access **Air:** Range	IDC/OGA Multinational GSN	C4I
6- SFA/MA	PT/CA	All Seasons	Land	**Land:** Access **Air:** Range	IDC/OGA Multinational GSN	None

First, the vignettes are compared to the SOF missions and tasks as described in NATO and U.S. SOF doctrine. This shows the variety and legitimacy of possible SOF tasks in the future Arctic region. NATO doctrine differentiates between principle SOF tasks (PT) and additional activities (AA). The data shows that two of the SR and SFA/MA vignettes are characterized as PTs, and the CP, HRO, and MCT vignettes are listed as AAs. The SAR vignette is neither of the two; however, it is considered to be an SOF mission for Denmark. As for U.S. SOF doctrine, all except the SAR vignette are considered to be SOF core activities (CA). This means that all but the SAR vignette would qualify as an SOF mission, and are listed as such in SOF doctrine. As for the SAR

vignette, this would only involve SOF when the mission would be conducted by Denmark.

Second, the data shows in what season the vignette is likely to take place. For the CP and HRO vignettes, this is currently the "summer season" (June–September). However, in the future this may change to "all seasons" for all vignettes. This would not only increase the probability of these vignettes as the Arctic opens up and activity goes up as well, but would also increase the area in which these vignettes might happen.

Third, the environment is depicted with only two options, maritime or land. The CP vignette is a part maritime, part land problem, but in the future, it could take place in both environments. However, it is important to note that the maritime environment will become more accessible over time because of the ice melt, where the land environment will become less accessible because of the ice and permafrost melt. The HRO and SAR vignettes are now set up in a maritime environment; however, they could also take place in a land environment. The MCT vignette can only take place in a maritime environment, and the SR and SFA/MA vignettes are land environment only scenarios. Although the Arctic region is considered to be a maritime environment, the likelihood of future missions occurring in a land environment is not significantly smaller. Also, there is a considerable amount of land, covered with ice and snow, above the Arctic Circle. Furthermore, vast areas of the Arctic Ocean will be covered with solid sea ice for a considerable amount of time even when the Arctic Ocean is considered ice-free. Therefore, both Army SOF and Navy SOF should prepare accordingly.

Fourth, the mobility aspect is divided up into land, sea, and air mobility depending on the relevance to the vignette. The analysis shows that regardless of the vignette, air assets have "range" as the key challenge. This is due to the vastness of the Arctic, the lack of military infrastructure or, as mentioned previously, because of the prevailing tyranny of distance. Furthermore, as a result of a lack of resources or capabilities, or a combination of the two, four of the vignettes require some form of sea mobility. There are two challenges with sea mobility. First, there is the current lack of accessibility due to a lack of adequate resources and training. This is depicted as "access" in the table. The second is depicted as "response time," and depends on the distance to

the nearest military or coast guard installation. Three of the vignettes require land mobility. The challenges with land mobility are very similar to those of sea mobility and, to a lesser extent, to that of air mobility as well. Accessibility will become an increasing challenge due to the melting of the permafrost. Furthermore, the current infrastructure is still poorly developed in the Arctic. As stated before in this thesis and shown in the analysis of the vignettes as well, overall mobility is a major challenge for anyone operating in the Arctic. However, it seems adequate resources to potentially overcome these problems exist and should be looked at as part of Arctic SOF preparations.

Fifth, what level of cooperation is required or likely to take place in the depicted vignettes in order to achieve mission success? The table shows three levels of cooperation. First, the state level requires national, bi-national, or multi-national cooperation. Whatever is considered likely given the situation in the specific vignette is what is shown in the table. For example, the CP vignette could be dealt with exclusively by the United States; however, in this vignette, it is likely that bi-national cooperation and collaboration will take place between the United States and Canada. What the vignettes also show is that for every vignette it will be likely to have multiple states involved. The second level is the interdepartmental cooperation (IDC), which is also described as working with OGAs, where different ministries, departments, or agencies are working together. Also for this level it is clear that in every vignette, interoperability between SOF and other agencies or departments is required. The third level of cooperation is the cooperation between SOF units of different nation states. It is depicted in the table as GSN, something that has gained momentum over the last few years, and has proven useful in other theatres of operation. For all but one vignette, it is considered likely that cooperation between different SOF will take place. If this cooperation does not involve a direct approach on the ground, face-to-face, then indirectly through ISR support or support of scarce resources. All three levels of cooperation will be crucial in order to be successful in a future contingency in the Arctic.

What are the critical capabilities for every vignette? Although the list is not exhaustive, this study has exposed SOF capability issues related to the vignettes in the future Arctic region. As stated in Chapter III, a capability is the ability to achieve an

objective in a military operation. For every vignette, except the SFA/MA vignette, Command, Control, Communications, Computers and Intelligence (C4I) is assessed to be critical in order to achieve mission success. Also, there are known issues with communications north of the 70-degree North latitude.[400] Furthermore, Maritime Domain Awareness (MDA) is critical, especially for the vignettes focusing on the maritime environment, and will be a continuous challenge, given the poor infrastructure. Another critical capability in two vignettes is the AAR capability needed to cover the required range and overcome the tyranny of distance in the Arctic. A last capability requirement mentioned in one of the vignettes is the availability of ice-strengthened ships, whether this is an icebreaker or a warship with an ice strengthened hull. For example, most cruise ships that sail the Arctic waters have an ice-strengthened hull. When a contingency occurs, chances are any (military, coast guard, or both) ships want to get close in order to assist. Although the critical capabilities seem to focus on the equipment like ice-strengthened vessels, a coastal radar station for MDA, or an AAR capability, training is another essential element of providing a capability. In fact, training is the basis in every vignette in order to be successful.

On a final note, what all of the vignettes point out in this analysis is that current and future challenges in the Arctic can be overcome by a combination of realistic training, the right equipment, and cooperation on a national and international level with a wide variety of agencies and stakeholders. In Chapter VI, these points will be further explained.

[400] Due to the unclassified status of this thesis, it is not possible to go further into detail about the exact issues and possible solutions.

VI. CONCLUSIONS AND RECOMMENDATIONS

The Arctic is a region where the growing accessibility of natural resources and opening sea routes will result in increasing security implications. There are neither supra-state institutions nor sufficient bi- or multilateral agreements in place yet to deal with future security issues. Historically, the Arctic was viewed as a peripheral relevant area where other regions merged. The geophysical change in the Arctic will not only have regional but global implications. The future of the Arctic will be significantly affected by the changing geophysical characteristics. However, the Arctic political landscape will depend on how the various stakeholders choose to view the changes taking place. International relations and events outside of the Arctic influence and affect the relationships and cooperation inside the Arctic. The increased Arctic focus from Arctic and non-Arctic states alike, coupled with these spillover effects of global politics, require a focus on mutual support and capability developments to ensure a sufficient framework for promoting and governing Arctic security cooperation. In this final chapter four main conclusions and four recommendations for improvements are discussed. The chapter concludes with recommendations for further study.

A. CONCLUSIONS

This study makes four primary conclusions. First, the current and future Arctic physical and political environment demands specially trained and equipped military personnel and units. Therefore, it seems likely that there is a future for SOF in the Arctic. The geophysical environment sets forth requirements towards specially trained personnel in order to operate and survive in Arctic conditions. The geopolitical environment—the political sensitivity—in the Arctic speaks to doctrinal application of SOF. Thus, the strategic ramifications not only indicate possible doctrinal SOF missions, but also point to SOF executing otherwise conventional missions because of the extreme and unique character of the Arctic.

Second, the Arctic capabilities of the countries analyzed in this study have declined while the requirement for such capabilities in the Arctic has increased. The most

significant decline is found within United States SOF, followed by the Danish and Dutch SOF. Each has reduced the level of Arctic training due to commitments and priorities in other theatres of operations. For both the Netherlands and Denmark, their Arctic experience is mainly gained from the Scandinavian Arctic and may need to be tested in conditions reflecting what is found further inside this region. Denmark has conducted joint multiagency SOF operations in the North Atlantic, and the Netherlands possesses a relatively elaborate Arctic capability including mobility assets. It seems that the United States is able to harvest knowledge from smaller countries like Denmark and the Netherlands to rebuild their ability to meet future contingencies. However, this calls for formalized and strategically focused multinational Arctic training and cooperation in contrast to today's grassroots or bottom-up Arctic SOF focus.

Third, future operations in the Arctic will depend on JIIM relationships and cooperation. As the vignettes show, cooperation on different levels will become increasingly important when conducting operations in the Arctic region. The Arctic already hosts an impressive and growing list of stakeholders. The Arctic merges five nation-states and joins east and west, exposing conflicting interests and redrawing demarcation lines from the Cold War. Future contingencies involving the military will span the entire spectrum of conflict, and will not merely be joint, but will require a JIIM approach.

Fourth, an increase of JIIM operations highlights the need for interoperability. The Arctic poses significant challenges regarding lines of communication to include satellite and navigation limitations. These issues exacerbate possible problems regarding command and control, especially amidst the vast distances associated with Arctic mobility. The entire range of mobility, strategic through tactical, deserves special attention. The historical analogy in Operation Eagle Claw shows how mobility issues can compromise a mission. The Arctic is equally challenging and more unique than deserts of the Middle East. AAR capability is crucial in order to ensure sufficient range to overcome the tyranny of distance in the Arctic, and enable a timely response in missions where land or naval assets are simply too slow. In certain areas of the Arctic, land mobility may be impossible in the summertime, resulting in a higher dependence on air

and naval assets. For naval assets, the Arctic Ocean requires ice-capable vessels. Unpredictability of sea-ice movement—even in "ice-free" conditions—makes navigating the Arctic waters hazardous.

B. CRUCIAL AREAS FOR IMPROVEMENT

This study recommends three crucial areas for improvement in order to meet the future for Special Operations in the Arctic. First, current and future Arctic exercises should reflect Arctic-specific military challenges and possible future contingencies. These exercises do not currently reflect the potential Arctic-specific challenges identified in this study. Furthermore, Arctic exercises should be held in different geographic locations in the Arctic, exposing future Arctic SOF to weather and terrain more accurately representing Arctic conditions. This study, by using the vignettes, shows how to focus the scarce resources toward what may be the future for SOF in the Arctic. Annually, several international training exercises are held where SOF can interface and cooperate with partner-nations and other agencies in order to overcome the challenges associated with JIIM organizations and task forces.

Second, networks, such as the Global SOF Network, should be further utilized in order to deal with Arctic challenges. The existing bottom-up Arctic SOF capabilities should be further integrated with national and partner-nation strategic focus to create Arctic SOF networks empowered to solve Arctic challenges while being responsible for maintaining sufficient multinational Arctic SOF capabilities. This networking will facilitate burden sharing and interoperability.

Third, national SOF should participate regularly in joint and international Arctic training exercises. Habitual international meetings at SOF-specific training and exercise venues must be officially recognized in order to continue in perpetuity. Small scale, informally organized training exercises are only successful in developing a capability to the extent that those personnel remain within the organization. Without regularly ingraining training and partnerships into the unit, the experience and capability leave with the people. Regular participation in such exercises will increase the size of the knowledge

base, while providing overlapping knowledge to accommodate the loss and gain of personnel into a SOF unit.

Fourth, unit commands and mission planners should transpose current problems of other littoral regions of the world onto the Arctic and prepare accordingly. Although the Arctic is currently characterized by ice and decreased mobility when compared to other littoral regions of the world, the geophysical studies are showing a trend of melting ice and opening of sea-lanes of communication. As indicated in Chapter IV, the opening of sea-lanes will bring with it a growing presence of commerce, tourism, and the potential for threats to follow. More mature littoral regions of the world, such as the Pacific, Atlantic, and Indonesian Archipelago will translate for what security concerns the Arctic region can expect in the future.

C. RECOMMENDED AREAS FOR FUTURE STUDY

The following are recommended topics for future study in areas that would enhance preparations for operating in the Arctic. These topics have been excluded from this thesis, as each would require in-depth research that cannot be justifiably captured here. The importance of these topics is complementary to developing an Arctic capability and consideration would greatly enhance mission and exercise planners. They include:

- Arctic littoral operations and equipment. By transposing current and historic issues from other littoral regions of the world it is possible to see probable scenarios, which might arise in the Arctic. Combining these scenarios with the Arctic geophysical environment will show what preparations must be done to meet future littoral challenges in the Arctic.
- Unresolved issues with navigation and communication capabilities in the Arctic.
- Arctic-specific SOF war gaming. A tabletop exercise or war game—using the vignettes in this thesis—could be valuable in retrieving additional information on military (SOF) operations in the Arctic. The vignettes and scenarios from this thesis could be used by any military command that is involved in the Arctic.

This study only explores a fragment of the changing Arctic. This study shows that the Artic is truly unique; not only in its geophysical character, but also in the rate the Arctic environment is changing, both physically and politically. While projecting current

capabilities into the Arctic is not a viable approach, this study suggests that by combining prognoses for the Arctic with lessons learned—also outside of the Arctic—allows the future military, to include SOF, to meet this changing and uncertain Arctic future. Therefore, this study is mostly an initial attempt to focus on the Arctic in all its vastness and set the stage for security cooperation in this important region.

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APPENDIX A. FUTURE ARCTIC WEATHER

A. GEOPHYSICAL CHANGE

This is a meta-study, creating an independent foundation for one of the pillars in this study, geophysical change, which together with the segment on the geopolitical environment delineates the strategic ramifications while trying to avoid biased conclusions and "climate governance."[401] This section also elaborates on certain meteorological conditions and metrics emphasizing the importance of preparing to operate in the Arctic environment.

1. Climate Change

As mentioned in Chapter I, the Arctic has received increased and significant political attention the last few years. The reason for this unprecedented devotion is the likelihood that climate change will expose abundant natural resources. It is, however, not merely a question of the Arctic nations securing their rights to underground resources; rather, it is also about opening sea routes and maintaining homeland security. These issues are geographically tied to the Arctic and the littoral nations; however, this is a problem of global significance that cannot be restricted to any one region. There are prognoses predicting flooding of low-lying coastal regions with disastrous consequences for the people living in these areas; causing millions of people to flee and seek higher ground.[402] Bangladesh is considered one of the areas most sensitive to global warming. There is, however, no need to look that far to find other "climate refugees." The *Guardian* announced, in a recent report, that citizens in the Alaskan village of Newtok as "America's first climate refugees."[403] However, it is not only the citizens of Newtok that

401 Louise van Schaijk, *Transnational Governance and Democratic Legitimacy: The Case of Climate Change* (The Hague, Netherlands: Clingendael, July 2014), 23.

402 The World Bank, "Warming Climate to Hit Bangladesh Hard with Sea Level Rise, More Floods and Cyclones, World Bank Report Says," Press Release, June 19, 2013, http://www.worldbank.org/en/news/press-release/2013/06/19/warming-climate-to-hit-bangladesh-hard-with-sea-level-rise-more-floods-and-cyclones-world-bank-report-says.

403 Suzanne Goldenberg, "America's First Climate Refugees," *Guardian,* May 13, 2013, http://www.theguardian.com/environment/interactive/2013/may/13/newtok-alaska-climate-change-refugees.

fear losing their homes to erosion. In March 2009, the U.S. Army Corps of Engineers released a study on the effects of erosion in Alaska.

> 178 Alaska communities were found to have reported erosion problems. After subsequent investigation, the Corps designated 26 communities "Priority Action Communities"—indicating that they should be considered for immediate action by either initiating an evaluation of potential solutions or continuing with ongoing efforts to manage erosion.[404]

The consequences of climate change are many and have global significance.

Military planners need reliable information about the weather. History shows that weather can mean the difference between mission launch, cancellation, or delay and ultimately the difference between failure and success. Knowledge about the weather is an integral part of military mission planning. The current research focuses exclusively on climate change, and does not answer the question: "What will the future weather be like in the Arctic?" This analysis on Arctic climate change is a meta-study providing insight to that question. Furthermore, existing studies and international panels contributing to research on climate change have previously been under investigation for legitimacy and reliability. "International governance of climate change has been referred to as a wicked problem.… The legitimacy of key institutions governing different aspects of climate change policy has been contested."[405] Experts still disagree on when sea routes will be "ice-free." This is a "moot point. What is important is the lanes [and Arctic resource exploitation] will be of great economic significance."[406] Not only is the science of climate change complex and contested, the assessments may be politically negotiated, possibly undermining their credibility.[407] This requires an independent study as the foundation for the analysis of SOF in the Arctic. While realizing a specific forecast is not possible this study points out characteristics of cloud ceiling and meteorological

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404 U.S. Army Corps of Engineers, "Alaska Baseline Erosion Assessment," Alaska District, U.S. Army Corps of Engineers, March 2009, ES1, http://www.climatechange.alaska.gov/docs/iaw_USACE_erosion_rpt.pdf.

405 Van Schaijk, *Transnational Governance and Democratic Legitimacy: The Case of Climate Change*, 23.

406 Kraska, *Arctic Security in an Age of Climate Change*, 138.

407 Van Schaijk, *Transnational Governance and Democratic Legitimacy*, 26.

visibility. The outset of the weather study is based on data from 2007 and 2012. These two years represent low points in recent Arctic ice concentration. The back wall of the study is the Intergovernmental Panel on Climate Change (IPCC-AR5) climate model, which predicts an ice-free Arctic Ocean by 2050. By using these anchor points, and applying quantitative data analysis, the study lays out seasonal probabilities for various meteorological metrics. In other words, this study provides insight to the question: "What will the future weather be like in the Arctic?" Before attempting to predict the future, it is necessary to establish a historical foundation.

a. Climatic Background

The Arctic is highly sensitive to temperature fluctuations,[408] and changes in climate manifest quickly in Polar Regions. As a result, the poles are good predictors as to what will happen in other regions of the world and have been the focal points for scientists attempting to forecast what is likely to happen globally.

b. Paleo-Climatic Studies

Two things are primarily connected to changes in sea level: melting of ice and the temperature of the ocean.[409] A historical study, using paleo-reconstruction, provides quantitative measures, which give an indication of how the climate once was. By using historical data, it is possible to conclude if recent events are indeed a significant change compared to previous centuries (Figure 17).

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408 Haiyan Teng, Gerald M. Warren, A. Meehl, Lawrence Buja, and Gary Strand, "Twenty-first Century Arctic Climate Change in the CCSM3 IPCC, Scenario Simulations," *Climate Dynamics* (January 2006): 601.

409 Aslak Grinsted, J. C. Moore, and S. Jevrejeva, "Reconstructing Sea Level from Paleo and Projected Temperatures 200 to 2100 AD," *Climate Dynamics* (January 2009): 8. doi:10.1007/s00382-008-0507-2.
https://www.broward.org/NaturalResources/ClimateChange/Documents/grinstedclimdyn09sealevel200to2100ad.pdf.

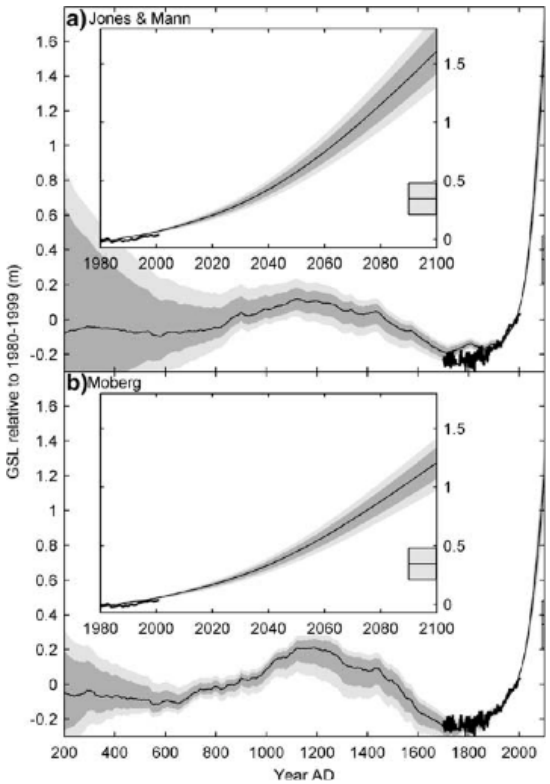

Figure 17. Sea level from 200–2000 AD.[410]

Aslak Grinsted, J.C. Moore, and S. Jevrejeva continue to conclude that the rise in sea level is associated with the melting of the continental ice sheets. Furthermore, the likely future rise in sea level far exceeds anything experienced in the past 2000 years (see Figure 17). John E. Walsh, James E. Overland, Pavel Groisman, and Bruno Rudolf[411] conducted a similar study, also focusing on paleo-climatic data samples from lake sediment, pollen records, diatoms, and tree rings, in order to reconstruct pan-arctic summer temperatures for the past 2000 years.

As Figure 18 shows, over the past approximately 2000 years, the Arctic experienced a relatively stable temperature with a modest cooling trend of approximately

410 Grinsted, Moore, and Jevrejeva, "Reconstructing Sea Level from Paleo and Projected Temperatures 200 to 2100 AD."

411 John E. Walsh, James E. Overland, Pavel Y. Groisman, and Bruno Rudolf, "Ongoing Climate Change in the Arctic," *Royal Swedish Academy of Sciences* (2012), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3357778/pdf/13280_2011_Article_211.pdf.

0.3 degrees Celsius. This changed in the twentieth century, with the appearance of a significant warming trend.

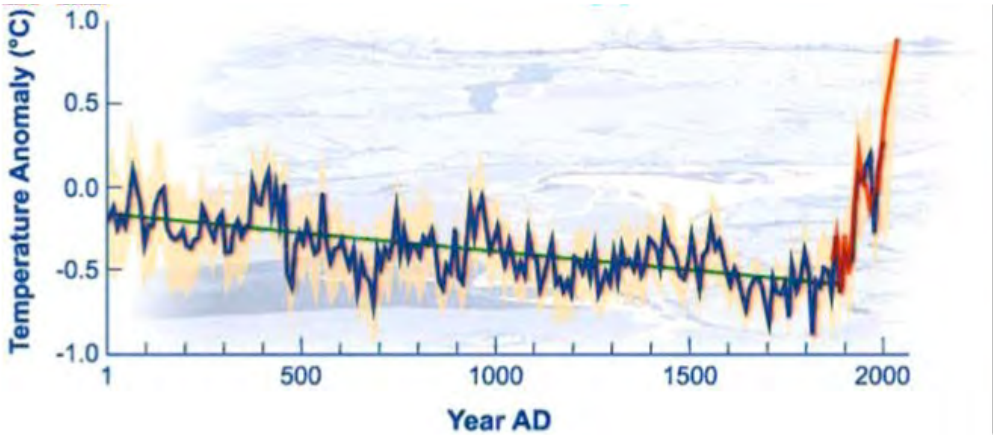

Figure 18. Cooling trend in the Arctic reversed in recent decades.[412]

From these rather large-scale studies at sea level, a shift in focus to the vertical layers of the lower atmosphere above the Arctic shows how temperature has changed in the past 100 years. In a study,[413] published in January 2012, Stefan Bronniman et al. encounter some anomalies in the early twentieth century data sets, particularly at the 700-hPa isobar (approximately 10,000 feet above sea level, ASL) and above in winter periods. However, their analysis does clearly indicate a smaller lapse rate[414] in the early part of the previous century, and Bronniman et al. are able to conclude that the lower troposphere did see significant warming in the past two decades. Figure 19 shows the data sets from the conclusion of the study. The graphs in the four figures represent 20-year windows for different data sets for different seasonal, regional averages: **a**) European Arctic in winter; **b**) Western Siberian Arctic in spring; **c**) Pacific Arctic in summer; **d**) eastern Canadian Arctic in autumn.

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412 Grinsted, Moore, and Jevrejeva, "Reconstructing Sea Level from Paleo and Projected Temperatures 200 to 2100 AD," 470.

413 Stefan Bronniman, Andrea N. Gant, Gilbert P. Compo, Tracy Ewen, Thomas Greisser, Andreas M. Fischer, Martin Schraner, and Alexander Stickler, "A Multi-data Set Comparison of the Vertical Structure of Temperature Variability and Change over the Arctic during the Past 100 Years," *Climate Dynamics* 39, no. 7 (January 2012).

414 Standard lapse rate is a decrease in temperature of 2 degrees Celsius per 1000 feet.

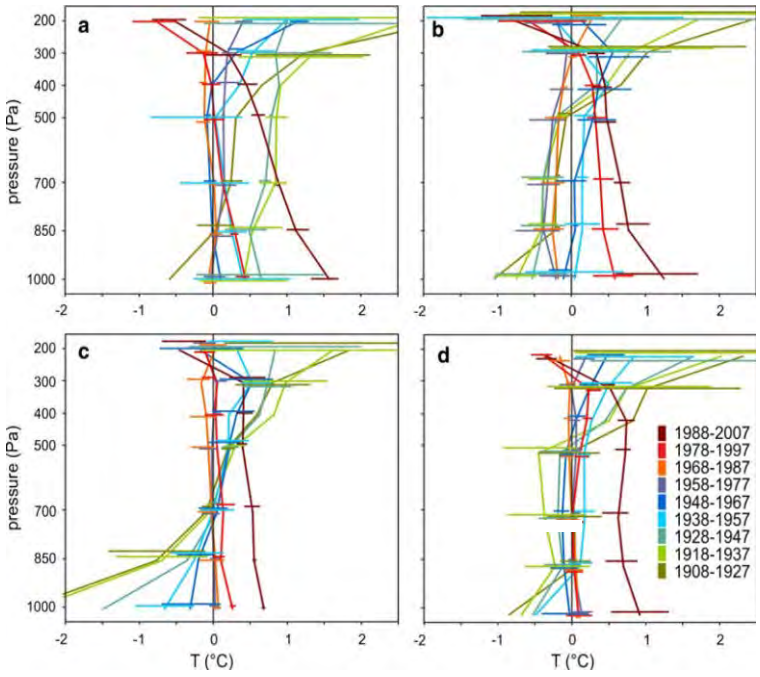

Figure 19. Seasonal regional averages.[415]

The conclusion from the data sets is that the last 20-year period (magenta) is notably warmer than the previous 100 years, and the warming occurs in the lower troposphere. In fact, the graphs not only indicate a smaller lapse rate above 10,000 feet ASL in the earlier years, there actually seems to be a temperature inversion in the higher layers in the early part of the century. This seems unlikely and may be attributed to the uncertainty of the earliest data as mentioned above. It is also worth noting that—as the study concludes—because warming only takes place in the lower levels, it increases atmospheric instability,[416] possibly causing more adverse weather with larger amounts of precipitation in the Arctic.

So far, the reviewed studies provide clear indications that the latest temperature changes are unique. Not just in modern times, but also from a 2000-year perspective. This conclusion creates a foundation for the next section in this appendix, which reviews more current observations and prognoses.

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[415] Bronniman, et al., "A Multi-data Set Comparison of the Vertical Structure of Temperature Variability and Change over the Arctic during the Past 100 Years," 43

[416] North Atlantic Treaty Organization [NATO], *Naval Arctic Manual (ATP 17(D)),* 2-1.

Up to now, surface melting has been the topic of discussion; however, this is not the only aspect worth considering. Changes in Arctic geophysical properties have caused intrusion of warm Pacific and Atlantic seawater. J. S. Turner studied "the advance of an anomalously warm tongue of Atlantic water intruding across the Arctic below the halocline[417] over the past few decades,"[418] analyzing melting of the Arctic ice from below. Calculations in the study show that the heat in the Atlantic layer alone could melt 1 meter of sea ice in 12 to 18 months, or all ice with a thickness of 2.5 meters in 4 years, if this heat was able to reach the surface in said periods.[419] This conclusion is another indication that the Arctic is an intricate and balanced system of many mechanisms. Some of these mechanisms are changing, however, to what degree is not yet fully understood.

Simulation is used to gain additional understanding of how the various mechanisms of the Arctic climate interact. The Community Climate System Model 3 (CCSM3) integrates four components: the atmosphere, ocean, sea ice, and land surface, "linked through a coupler that exchanges fluxes and state information among these components."[420] Haiyan Teng et al.[421] use the CCSM3 to analyze the arctic climate change through scenario simulations. Using full spatial patterns, they create a variance of models to understand what dominating factors prevail. Though not the primary focus of this paper, it is worth mentioning that this study involves the specific impact of changes in sea level pressure, greenhouse gases, and temperature change. The outcomes of the different scenarios vary greatly. The chosen model predicts a decline in sea-ice in winter of 1.4 percent to 3.9 percent, and 4.8 percent to 22.2 percent in the summer per decade. This leads to two conclusions. First, though using state-of-the-art simulation software (at

417 The vertical zone in the oceanic water column in which salinity changes rapidly with depth.

418 J. S. Turner, "The Melting of Ice in the Arctic Ocean: The Influence of Double-Diffusive Transport of Heat from Below," Journal of Physical Oceanography 40, no. 1 (January 2010): 249–256.

419 Ibid.

420 "The Community Climate System Model version 3 (CCSM3)," *Journal of Climate* 19 (2005), www.Journals.ametsoc.org.

421 Teng, et al., "Twenty-first Century Arctic Climate Change in the CCSM3 IPCC Scenario Simulations," 604.

the time), there is still a great deal of variance between the models applied.[422] Second, it is also clear that the greatest changes occur in the summer. A speculation from this would be if the winter decay were less than summer decay, the remaining ice in the arctic would have become younger and younger. In the conclusion of their study, Teng et al. settle on the "A2-model." This model predicts the Arctic to become ice-free by the end of the twenty-first century.

In a study from winter 2008, Mark Serreze re-evaluates the IPCC[423] report, focusing on the human impact on climate change. The conclusion is that reality seems to be 30 years ahead of previous prognoses.[424] This would move the ice-free Arctic forward to approximately 2070. In 2009, Muyin Wang and James Overland conducted an analysis based on six IPCC models. By applying observational constraints into the IPCC models, it results in a prediction of a nearly sea-ice-free Arctic in September by 2037.[425] This is a dramatic prediction compared to previous models. In 2011, CCSM released its latest report,[426] CCSM4. In the selected model, the authors discuss the aforementioned values presented by Wang and Overland. However, the CCSM4 estimate is an ice-free Arctic in 2070.[427] Also worth noting, is the fact that the Arctic—based on the previously applied metric—will be reduced in size by 44 percent between 2005–2100.

Finally, a review of the conclusions regarding melting of the Arctic sea-ice from the latest IPCC report, released September 2013.[428] It contains elements from several of

422 Using exponential decay, 4.8 percent only results in a 35 percent overall reduction of the Arctic sea-ice at the end of the twenty-first century, whereas a 22.2 percent reduction per decade results in the Arctic being ice-free in 2080. These are significantly different prognoses.

423 IPCC Fourth Assessment Report in 2007 (IPCC AR-4).

424 Mark C. Serreze, "Arctic Climate Change: Where Reality Exceeds Expectations," *Witness the Arctic* 13, no. 1, (Winter 2008/2009).

425 Muyin Wang and James E. Overland, "A Sea Ice Free Summer Arctic within 30 Years?" *Geophysical Research Letters* 36 (2009): 200, doi:10.1029/2009GL037820.

426 "Twenty-first-Century Arctic Climate Change in CCSM4," 25.

427 Ibid., 27.

428 IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. T. F.D. Stocker et al. (Cambridge, UK; New York: Cambridge University Press, in press).

the sources used in this paper and is considered the most elaborate study in this review. The report settles on a more pessimistic trend compared to the previous IPCC models.

> Among the five selected models, four project nearly ice-free Arctic Ocean in September (sea ice extent less than 1*10^6 km^2 for at least five years) before 2050 … the earliest and latest years of near disappearance of the sea ice pack being ~2040 and ~2060, respectively.[429]

c. Summary and Conclusion on Climatic Background

The section on climatic background provides a review of select and representative research on the Arctic. The resources for this are plentiful and far from exhausted. There are more mechanisms, or contributing factors, to consider when discussing the geophysical future for the Arctic than presented in this paper. However, the research unanimously indicated an obvious trend for the Arctic climate. Furthermore, identifying the individual mechanisms which contribute to melting of the ice is beyond the scope of this analysis. Moreover, how these mechanisms interact and contribute to melting of the Arctic ice is still a major challenge for scientists to understand. This review only creates an understanding of some of the variables that are at play in order to answer two questions: Will the Arctic sea become ice-free? If so, when will it happen? No matter what the specific reasons are going to be, the research shows—from a 2000-year perspective—that the ongoing events in the Arctic are unique. The future trend is equally clear: the ice in the Arctic Sea will seasonally melt. "The unresolved question regard[ing] when this new arctic state will be realized, how rapid the transition will be, and what will be the impact of this new state on the Arctic and the rest of the globe."[430] The latest IPCC report comprises elements from several of the other studies in this paper and answers some of Serreze's questions.

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[429] B. Kirtman, et al., "Near-term Climate Change: Projections and Predictability," in *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* ed. T. F.D. Stocker et al. (Cambridge, UK; New York: Cambridge University Press, in press), 11–37.

[430] Mark C. Serreze, Marika M. Holland, and Julienne Stroeve, "Perspectives on the Arctic's Shrinking Sea-Ice," *Science,* New Series 315, no. 5818 (March 2007): 1533–1536.

Predictions of an ice-free Arctic range from 2037[431] to 2100.[432] The CCSM predictions changed with the advent of the CCSM4 report in 2011, where the ice-free summer Arctic was set to arrive in 2070. The latest IPCC report (September 2013) predicts an Arctic Ocean where the ice has nearly disappeared by 2050. Considering that this is the most recent and elaborate report, and the fact that it also represents an approximate mean value of the various prognoses, 2050 is the adopted prediction for this study.

2. Future Arctic Weather

By looking at the correlation between Arctic sea ice and the weather, in particular cloud cover and cloud type, and examining historical records, several factors were eliminated that would otherwise influence this analysis and complicate the model.

a. Assumptions

Models are systematic simplifications of real-world intricacies that allow a problem to be more easily solved. In order to create a useful model, it is necessary to base the model on assumptions and account for the effects of these assumptions when drawing conclusions from the analysis. It is thus necessary to adopt the following simplifying assumptions to make the model mathematically tractable:

1. Based on the section about climatic background it is safe to assume that the Arctic sea ice will continue to melt. Hence, this trend, as identified in the climate studies, can be used to predict a future 'ground truth,' and make predictions how the weather will influence tactical mobility in the Arctic.

2. A correlation exists between wind, cloud type distribution and ceiling, temperature, humidity, and atmospheric pressure in the Arctic as well as most other places on earth.

[431] Wang and Overland, "A Sea Ice Free Summer Arctic within 30 Years?"

[432] "The Community Climate System Model version 3 (CCSM3)."

b. Sea Ice versus Cloud Analysis

Scientists analyze how various aspects of climate change affect the changing Arctic SIC. By studying the correlation between several climatic particulars, scientists attempt to establish prognoses that predict what the Arctic SIC will be in the future. These geophysical climate studies have strategic impact on the evolving geopolitical environment in the Arctic. Table 3 is an example of a quite comprehensive regression analysis from a study on how to make long-range SIC forecasts.

Table 3. R and R^2 obtained when performing linear regression between our prediction (SIC in October in the Beaufort Sea) and the August values of the listed variables (two-month lead time). The variables are ranked by their R^2 values (highest R^2 listed first).[433]

Predictors	R	R^2
SIC BS (August)	0.75357	0.567868
T surface air IC	-0.7145	0.51051
SST CS	-0.5573	0.310583
Z 850 hpa IC	-0.4985	0.248502
T surface air BS	-0.48568	0.235882
ocean temperature 5 m BS	-0.46406	0.215355
Z 850 hpa BS	-0.35254	0.124287
v wind surface BS	0.30617	0.09374
AO	0.288654	0.083321
NAO	0.252233	0.063621
PNA	-0.24495	0.060001
SOI	0.24244	0.058777
u wind surface BS	0.192517	0.037063
MEI	-0.16505	0.027242
Nino 3.4	-0.16274	0.026484
u current 5-57 m BS	0.036114	0.001304
v current 5-57 m BS	0.034264	0.001174

Noting that Megan Stone is trying to predict SIC in October, it seems logical that the closer the data (in this case August) is to the desired timeframe, the stronger the correlation will be. However, it is not that simple, and not completely linear, as many variables are in play. For instance, the equivalent September SIC Beaufort Sea (BS) R^2 is

433 Table description and values are from Megan Stone, "Long-Range Forecasting of Arctic Sea Ice" (master's thesis, Naval Postgraduate School, 2010), 57.

lower (0.5486) than the August value in the Table 3.[434] The R^2 SIC BS spans from 0.2523 in May to 0.5678 in August. Although inconsistent, the table gives an indication of the variables that are considered when trying to forecast SIC and to what extent these variables correlate with SIC.

Scientists have also researched the impact of clouds (Eastman[435] and Sato[436]) on the Arctic SIC. By reversing this approach and trying to predict what the clouds and the meteorological conditions will be depending on the SIC, it is possible to use the sea ice forecast, or even a satellite picture of SIC, to provide near-future operational insight into what the weather will be in the Arctic.

By using a simple linear regression model, it is possible to describe the correlation between selected variables. By calculating the correlation coefficient (R), the coefficient of determination (R^2), and the p-value, it is possible to test the strength of the regression. In other words, this provides an indication as to what extent the model explains the meteorological conditions relating to the chosen variables, cloud cover versus SIC.

In his study from 2009, Ryan Eastman concludes that:

> This shrinking ice cover has been accompanied by an increase in surface temperature of almost 0.5 degrees C per decade from 1979 through 2003 as observed by the International Arctic Buoy Program (Rigor et al. 2000) … ~40 % of the Arctic warming was due to cloud changes resulting from warming….[437] The Arctic region is shown to be a very cloudy region with an average around 70%[438] cloud cover. Clouds are more prevalent over oceanic regions of the Arctic. A pronounced yearly cycle of cloud cover exist over the 'High Arctic.'… This pattern is not entirely latitude-dependent, but instead appears to be geographically based upon the sea ice and the colder, continental regions within the Arctic…. Overall,

434 Ibid., 58.

435 Ryan Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice" (master's thesis, University of Washington, 2009).

436 Sato et al., "Impact of Arctic Sea-Ice Retreat on the Recent Change in Cloud-Base Height during Autumn."

437 Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice," 1.

438 For aviation purposes a cloud ceiling is a cloud cover equal or greater than five octas (5/8) = 62.6% cloud cover. For more information on meteorological practices see International Civil Aviation Organization, *Manual of Aeronautical Meteorological Practice* (Doc 8898 AN/893) (Quebec: ICAO, 9th edition, 2011), 2–17.

> relationships between ice, temperature and clouds indicate that cloud trends may enhance the warming of the Arctic and may be acting to accelerate the decline of Arctic sea ice.[439]

From Eastman's aforementioned conclusion, the following is extracted: The Arctic is a cloudy region with very a pronounced yearly cycle of cloud cover (Figure 20). Clouds are more prevalent over oceanic regions of the Arctic. This pattern is not entirely latitude dependent, but instead appears to be geographically based upon the sea ice; therefore, studying SIC should provide insight pertaining to clouds in the Arctic as well. Finally, relationships between ice, temperature, and clouds may affect the melting of the sea ice. It is the correlation between the variables (sea ice and clouds), as laid out by Eastman, which will be the subject of the regression analysis. This is a very simple task, but if it is possible to prove a strong correlation between the independent variables, it will be a very powerful tool for operational planning. For illustrative purposes, comparing Stone,[440] the seasonal cycle of SIC BS to the cloud cover seasonal cycle, and Eastman,[441] in Figure 20 and Figure 21, a negative correlation appears to exist between SIC and cloud cover.

[439] Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice," 70–71.

[440] Stone, "Long-range Forecasting of Arctic Sea Ice," 2010.

[441] Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice.

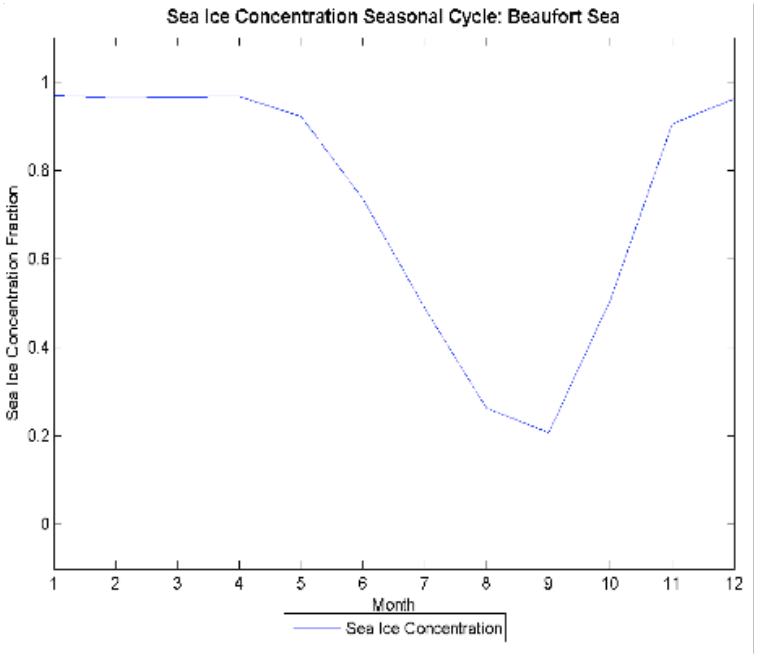

Figure 20. LTM seasonal cycle of SIC in the Beaufort Sea based on data from January 1979 to December 2007. SIC is at a minimum in August–October as the Beaufort Sea transitions from conditions favorable for melting to conditions favorable for freezing.[442]

[442] Stone, "Long-range Forecasting of Arctic Sea Ice," 30.

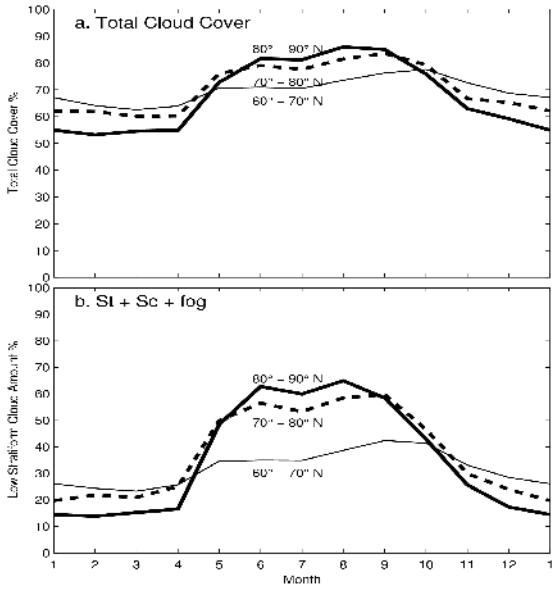

Figure 21. Annual cycles of cloud cover by latitude band. a) Annual cycles of total cloud cover within 10˚ latitude bands in the Arctic; b) Annual cycles of stratiform cloud cover within the same latitude bands.[443]

It is also evident that by comparing the percent "Low stratiform cloud cover amount percent" in Figure 21 (b) to the total cloud cover (a), the majority of the total clouds are low stratiform clouds.[444] Hence, calculating the August 80^0 –90^0 N, which corresponds to a total cloud amount 87 percent, yield the following:

August stratiform cloud amount: 66 percent

Total Cloud amount: 87 percent

Therefore:

$$\frac{0.66\ Stratiform}{0.87\ total} = 75.9\%$$

Approximately 76 percent of the total cloud cover is low stratiform clouds.

443 Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice," 22.

444 A stratiform cloud is in the category of low clouds (see Figure 25) and often has great impact on the ability to conduct airmobile operations because of low ceiling and poor visibility.

September 2007 and 2012 were low points in Arctic SIC. Realizing the Arctic sea ice is melting, the geophysical conditions in September may be good indictors of what the weather in the Arctic will be like to an increasing extent in the future. The graphs in Figures 20 and 21 may widen as the weather conditions change towards the "nearly ice free" predictions in the IPCC (AR5) report previously mentioned, bringing weather conditions from the lower Arctic up to higher latitudes in the future. This results in relatively greater cloud cover in the high Arctic, particularly from January to April and October through December. Based on the hypothesis that there is in fact a correlation between sea ice and cloud cover, the impact on cloud cover from receding sea ice should be greatest in September. Calculating a single regression—between annual total cloud cover using data extracted from Figure 21 and SIC seasonal cycle using data from Figure 20—provides operational insight into the tactical (geophysical) conditions in the Arctic. Figure 22 shows the plots from the regression data. In short, by performing a simple meta-analysis on existing climate studies (in this case, those done by Stone and Eastman), insight is obtained that defines tactical requirements towards applications of military assets in the Arctic. This in turn affects the means available for a viable Arctic security strategy. The regression statistics are derived from Table 4 and included in Table 5. From the tables, it is clear that there is a strong relationship between cloud cover and sea ice. In fact, the change in SIC explains 78 percent of the change in total cloud cover (Table 6).

Table 4. Regression data.

Source: Stone		Source: Eastman
Month	Ice fraction	cloud cover
January	0.97	55
mid January	0.96	54
February	0.96	53
mid february	0.96	54
March	0.96	55
mid march	0.97	55
April	0.97	55
mid april	0.94	64
May	0.92	73
mid may	0.83	77
June	0.73	82
mid june	0.61	82
July	0.49	81
mid july	0.37	84
August	0.28	87
mid August	0.24	86
September	0.21	85
mid september	0.37	80
October	0.5	76
mid October	0.7	70
November	0.9	63
mid november	0.93	61
December	0.96	59

Table 5. Regression statistics. Note: R Square 0.78 at a significance level of 0.05.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.883950676
R Square	0.781368798
Adjusted R Square	0.770957789
Standard Error	6.071948086
Observations	23

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2767.064723	2767.065	75.05216	2.24423E-08
Residual	21	774.2396247	36.86855		
Total	22	3541.304348			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	98.57002227	3.621701591	27.21649	7.34E-18	91.03828151	106.1018	91.03828	106.1018
Ice fraction	-40.41306111	4.664876371	-8.66327	2.24E-08	-50.11420259	-30.7119	-50.1142	-30.7119

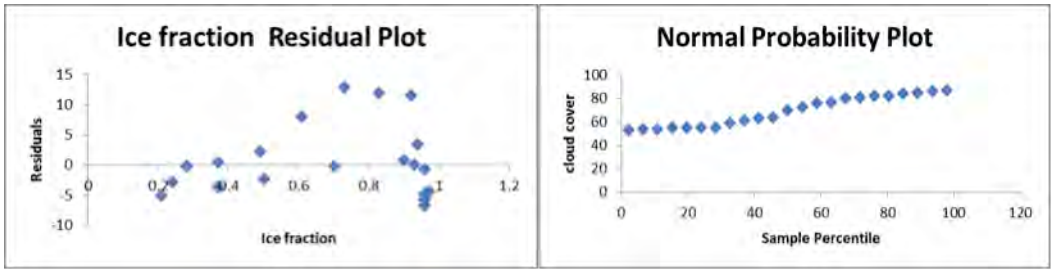

Figure 22. Regression data and plots.

Thus, by looking at the satellite imagery in Figure 23, it should not only be possible to get an idea how clouds and the weather in the Arctic has changed since the beginning of these observations in 1979, it should also be possible to make a prediction how cloud distribution will be when the ice continues to melt.

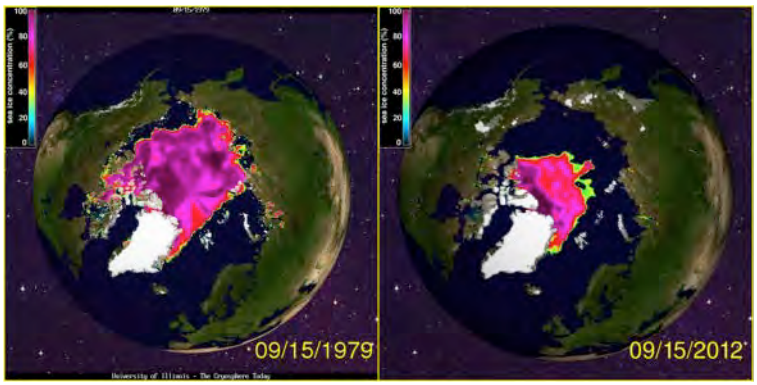

Figure 23. Satellite imagery of September SIC from 1979 and 2012.[445]

Model:

$$Lower: Total\ cloud\ cover = -50.11 * (SIC\ fraction) + 91.04$$

Upper: $Total\ cloud\ cover = -30.71 * (SIC\ fraction) + 106.1$

Example (year 2015): hypothetical SIC of 0.2 in September

Total cloud cover (percent) will be in the range of:

$$(-50.11 * 0.1 + 91.04) \text{to } (-30.71 * 0.1 + 106.1)$$
$$= 81.02 \text{ to } 99.96\ \% \text{ total cloud cover}$$

445 The Cryosphere Today, "Compare Daily Sea Ice," http://igloo.atmos.uiuc.edu/cgi-bin/test/print.sh?fm=09&fd=15&fy=1979&sm=09&sd=15&sy=2012.

Table 6. Total cloud cover, Lower (L) and Upper (U) in percent as a function of SIC.

Model	Lower	Upper
SIC fraction	Cloud cover in percent (L)	Cloud cover in % (U)
1	40.93	75.39
0.9	45.941	78.461
0.8	50.952	81.532
0.7	55.963	84.603
0.6	60.974	87.674
0.5	65.985	90.745
0.4	70.996	93.816
0.3	76.007	96.887
0.2	81.018	99.958
0.1	86.029	103.029
0	91.04	106.1

It is worth noting that he upper limit of the model predicts a total cloud amount of (U) 106.1 percent. Although Eastman does discuss a cloud cover totaling more than 100 percent because of different types of layered clouds,[446] this simple model does not incorporate that element, and the (U) model should be limited at 100 percent (Figure 24).

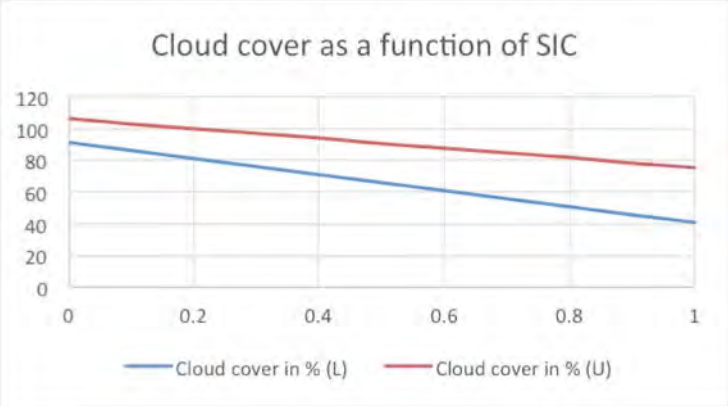

Figure 24. Total U and L cloud cover.

446 Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice," 21.

c. Application of Findings

After analyzing significant elements of the geophysical environment in the Arctic, it is time to interpret the results. In other words, what does it mean when the majority of the sky is covered in stratus clouds? How does sea ice affect the military's ability to operate in the region? There is more to the weather in the Arctic than clouds. Clouds are, however, a good indicator of some of the other relevant meteorological metrics. Eastman explains how stratiform clouds are the dominant type of cloud in the Arctic (76 percent of the total cloud cover, of about 87 percent, are stratus clouds),[447] sometimes with a ceiling tapering down to the ground or surface in which case it becomes fog with a visibility below 1000 meters (or 5/8 statute mile).[448] Another important cloud type Eastman discusses is Nimbus stratus (Ns). Ns is typically a widespread precipitating cloud with a large vertical extent.[449] Eastman shows that Ns cloud amounts peak in spring and fall at approximately 20 percent.[450] Given that Ns clouds are inherently widespread, this indicates that certain Arctic regions may experience poor weather conditions in the spring and fall, severely hampering military mobility. To get complete insight on the prevailing ceiling and visibility—along with other important metrics such as sea state and mobility over land (in the event that previously frozen tundra thaws)—in the Arctic region requires further analysis of meteorological data. This discussion is, however, sufficient to illustrate that the weather in the Arctic sets forth special requirements for tactical mobility in the Arctic region. Clouds will inevitably make it difficult for aviation operations due to low ceilings with poor visibility. Furthermore, there is a likely risk of encountering ice in the clouds if trying to mitigate adverse weather by attempting to

447 Ibid., 20.

448 NOAA, "Aviation Weather Center," June 9, 2011, https://aviationweather.gov/static/help/taf-decode.php.

449 For more information on cloud classification, see American Meteorological Society, "Meteorology Glossary," http://glossary.ametsoc.org/wiki/Nimbostratus.

450 Eastman, "Inter-annual Variations of Arctic Cloud Types in Relation to Sea Ice," 25.

climb above the lower cloud layers,[451] which in itself could be difficult or impossible to accomplish due to Ns clouds and equipment limitations (Figure 25).

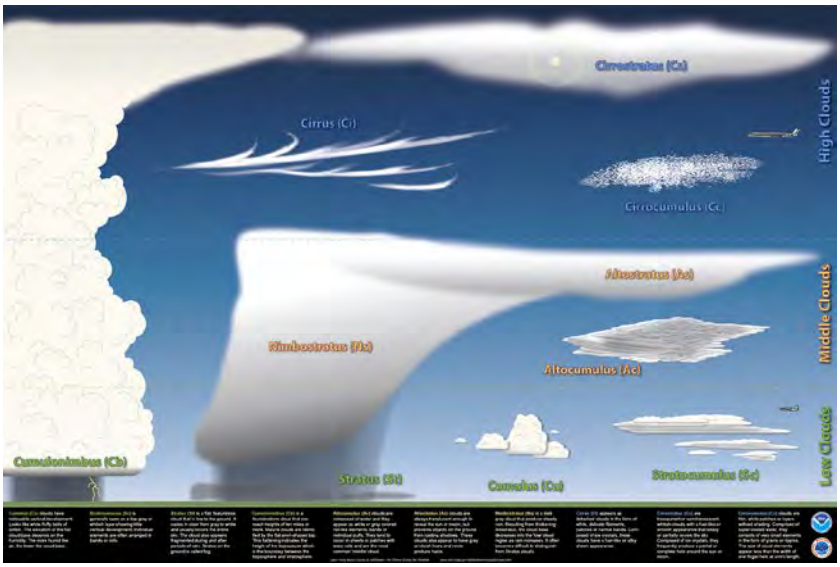

Figure 25. Cloud classification.[452]

The Arctic is considered a hostile environment from a civilian aviation perspective.[453] Commercial air traffic is driven to the Arctic for the same reasons behind current geopolitical changes in the Arctic—economic incentive; it is the shortest route across the Atlantic. There are specific regulations and manuals pertaining to North Atlantic operations, e.g., *North Atlantic International General Aviation Operations Manual*.[454] Although the military does not always follow the same safety requirements as its civilian counterparts, specific training, planning, rehearsal, and equipment is paramount in order to prepare for the adverse and changing Arctic environment discussed

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451 This is a common contingency if encountering weather conditions unsuitable for flight under Visual Meteorological Conditions in aviation mission planning. See Headquarters of the Department of the Army, *Army Regulation 95-1,* 39 paragraph 5–6.

452 NOAA, "National Weather Service: Jetstream – Online School for Weather," http://www.srh.noaa.gov/jetstream/clouds/images/cloudposter.jpg.

453 JAA, "JAR-OPS 4 Subpart F, section 1," http://www.jaa.nl/secured/Operations/Helicopters%20Archives/03HSC_Documents/Jan-Feb02/Comparison%20between%20HELO%20HAGO%20and%20HSO%20(HSC%20Orlando).pdf.

454 FAA, *North Atlantic International General Aviation Operations Manual*.

in the previous analysis. Once again, this is particularly important if attempting to successfully conduct missions operating in, and not just above, the Arctic.

NATO ATP-17(D) *Naval Arctic Manual* was published during the time of writing this study. ATP-17(D) supports the findings in this study concerning the weather in the Arctic.

> The general character of cloud cover over the Arctic differs considerably from that considered typical foremost [sic] temperate regions…. The uniform and contourless stratus clouds … give to the Arctic its reputation of a dull and monotonous appearance ... the low stratus-type cloud constitutes from 70–80 percent of all clouds observed.[455]

Further, ATP-17(D) elaborates on some of the other meteorological metrics beyond this study and shows the importance of preparing to operate in the Arctic environment. ATP-17(D) also states how melting "in some cases, completely inhibits summer ground mobility…Less than five percent of the Arctic lands are covered with permanent ice….[456]

> The Arctic littoral have "distinctive processes at break-up or freeze of ice…. On coasts where the tidal range is considerable, boulder barricades are the most conspicuous sign of the action of sea ice. Typically there is a narrow string of boulders parallel to the shore and several hundred feet out. They represent navigational danger on the approach to many open beaches…. Thermal erosion may also produce glacier-like mud streams.[457]

These conditions may inhibit conventional littoral operations. ATP-17 also states that "precipitation over most of the Arctic is very light and the annual amounts are so small that the region is classified as a desert based on annual precipitation."[458] Lack of precipitation is not the only commonalty between Arctic and desert environments; "the lack of contrast, particularly where all surface objects are covered with new snow, results in the inability to distinguish objects close at hand."[459] This seems relevant to all

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455 North Atlantic Treaty Organization, *Naval Arctic Manual (ATP 17(D))*, 2–10.

456 Ibid., 1–5.

457 Ibid., 1–8.

458 Ibid., 2–10.

459 Ibid., 2–9.

mobility assets, whether air, ground or naval. These white-out conditions are augmented by the uniformity[460] of the Arctic; the lack of trees and other significant vegetation,[461] reducing visual cues, in turn hampering the ability to operate based on visual references in the same manner as in more temperate regions. This condition is referred to as "Arctic white-out."[462] In the summer months, at which time the Arctic is most accessible, precipitation may fall as freezing rain or freezing drizzle. While this may inhibit airmobile operations, this is reported as less than ten hours per year.[463] Therefore, the primary concern for mobility seems to be the low clouds, with possibly associated icing, and poor visibility in fog along with periods where ground mobility is impossible on the tundra.

Not only is the Arctic a unique and hazardous ice desert, the Arctic is primarily a maritime environment. "The single feature that makes the Arctic Ocean markedly different from most of the world's oceans is the presence of a perennial sea ice."[464] The sea ice imposes restrictions on ships operating in the Arctic. This will affect what type of ships can be used for staging or basing of SOF or as mobility assets. "In the Arctic there are no generalizations that can be made about the occurrence of sea ice in relation to latitude … one of the most important forecasting problems is ice motion."[465] This is not only important for ships in the Arctic, remembering the correlations between sea ice and cloud cover, the uncertainty of sea ice conditions will affect forecasting of Arctic weather, in turn affecting ground, air, as well as naval forces, illustrating the uncertainty and hostility associated with operating in an Arctic environment.

d. Conclusions and Recommendations:

The single regression between annual total cloud cover and SIC seasonal cycle provides insight towards the weather in a future Arctic environment. This may shed light

460 Ibid., 1–5, 2–9.

461 Ibid., 1–2.

462 Ibid., 2–10.

463 Ibid., 2–11.

464 Ibid., 4–1.

465 Ibid., 4–5.

on some of the uncertainty in forecasting Arctic weather. As shown in the model, the change in SIC explains 78 percent of the change in total cloud cover in the Arctic. Although there is more to the weather in the Arctic than just cloud cover and visibility—as NATO ATP 17(D) outlines—it is a good indicator for other meteorological metrics. In order to avoid disaster in future Arctic military operations, planners, aviators and other mobility assets operating in a future Arctic environment should be aware of the specifics of the unique, hostile, and changing Arctic weather patterns. In short, ground mobility is likely inhibited in spring and summer months. Low clouds with reduced visibility and Arctic white-out conditions, as well as icing impose restrictions on air mobility. The unpredictability of sea ice forecasting influences how naval forces can operate in an Arctic environment, which is by all measures primarily maritime. However, as history has shown before, detailed knowledge of the weather and regional specifics can mean the difference between success and failure. Therefore, the forces going to operate in the Arctic must prepare accordingly. The Arctic is unique, whether it is viewed from a ground, air, or naval forces perspective.

APPENDIX B. STRATEGIES OF THE ARCTIC FIVE (A5)

This appendix will offer a summary of the Arctic strategies of the five Arctic littoral nations. The biggest takeaways of the individual strategies of the A5 are described in Chapter IV of the thesis.

A. CANADA

In 2009, Canada produced a specific Northern strategy titled "Our North, Our Heritage, Our Future," aimed at promoting a prosperous and stable Arctic region.[466] The Northern strategy clearly identifies the following four key pillars:

1. Exercising our Arctic Sovereignty.
2. Promoting Social and Economic Development.
3. Protecting our Environmental Heritage.
4. Improving and Devolving Northern Governance.[467]

The strategy states that these four priorities are equally important and mutually reinforcing; however, there is a strong undertone of sovereignty throughout the entire document. The strategy calls for the continuation and expansion of the ability to protect and patrol the land, sea, and sky. Furthermore, Canada is pledging more "boots on the Arctic Tundra, more ships in the icy water, and a better eye-in-the-sky."[468] This is exemplified by ongoing efforts to procure new polar icebreakers and construct deep water berthing and fueling facilities.[469]

In addition to military modernization focused on the Arctic, the Canadian strategy is also serious about social and economic development; specifically, Inuit and other Northern inhabitants, resource development, and stewardship. Canada is ensuring that the

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466 Department of National Defence, "Canada's Northern Strategy," Ottawa, 2009, http://www.northernstrategy.gc.ca/cns/cns-eng.asp.

467 Ibid., 2.

468 Ibid., 9.

469 Ibid., 10.

international drive for Arctic resources does not undermine improvements in quality of life for people of the North. Government resources are being strategically allocated to ensure Northern residents are poised to seize these unprecedented opportunities, while facilitating self-government agreements aimed at self-sufficiency.[470]

Outside of its borders, Canada is eager to lead on the international Arctic stage, with a statement on Northern foreign policy focused on cooperation, diplomacy, and international law. Canada also plays a leading role in the Arctic Council, has ratified the UNCLOS, and is committed to the goals of the IMO. The published foreign policy lists four key efforts that are yet to be resolved and involve the International community:

1. Engaging with neighbors to seek to resolve boundary issues.
2. Securing international recognition for the full extent of our extended continental shelf.
3. Addressing Arctic governance and related emerging issues, such as public safety.
4. Creating the appropriate international conditions for sustainable development.[471]

These directly relate to the primary potential friction points in the Arctic from a Canadian point of view. First, there is a dispute with the United States with respect to the NWP and Beaufort Sea boundary. Second, there is a dispute with Denmark in reference to the ownership of Hans Island (within the NWP). Finally, Canada has submitted a UNCLOS claim for an ECS, which conflicts with Russia's ECS claim, and will likely overlap with future claims from Denmark and the United States. An ECS claim—processed through the UNCLOS—potentially extends a state's sovereign territory past the standard 200 nautical mile EEZ.[472] Such claims are clearly tied to lucrative Arctic natural resources, and are therefore potential points of conflict. Canada intends to resolve

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[470] Ibid., 4.

[471] Department of National Defence, "Statement on Canada's Arctic Foreign Policy: Exercising Sovereignty and Promoting Canada's Northern Strategy Abroad," 2010, http://www.international.gc.ca/arctic-arctique/arctic_policy-canada-politique_arctique.aspx?lang=eng.

[472] Kathryn Isted, "Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations," *Journal of Transnational Law and Policy* 18, no. 2 (Spring 2009): 343, 350.

these disputes with cooperation and diplomacy, always in line with international law. That being said, the foreign policy directive is quick to point out that Canada will "never waver in our commitment to protect our North,"[473] providing a very clear strategic message to the International community on Canadian intentions.

B. DENMARK

The Kingdom of Denmark has produced a detailed Arctic strategy that is focused on its three realms: Denmark, Greenland, and the Faroe Islands.[474] In order to prepare for the opportunities that are quickly opening in the Arctic, the strategy aims to reinforce the foundation for appropriate cooperation; specifically, it focuses on the 2011–2020 time period. The Danish Arctic strategy explicitly outlines the following four key objectives:

1. A peaceful, secure, and safe Arctic.
2. Self-sustaining growth and development.
3. Development with respect for the Arctic's vulnerable climate, environment and nature.
4. Close cooperation with our international partners.[475]

These objectives speak to the overall tone of the strategy, which is one of peaceful cooperation and development. While similar to the Canadian strategy, there is notably less stress on sovereignty. Furthermore, it is void of the homeland security concerns that are central to the United States strategy.

The first objective, a peaceful, secure, and safe Arctic, is central to the Danish strategy. Similar to Canada, Denmark views the UNCLOS as the international legal instrument that defines a state's rights and responsibilities in the Arctic Ocean. Along with the other four Arctic littoral states, Denmark is planning to submit a claim for an ECS. This will likely conflict with claims from Canada, Norway, and Russia, creating

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473 Department of National Defence, *Statement on Canada's Arctic Foreign Policy: Exercising Sovereignty and Promoting Canada's Northern Strategy Abroad*.

474 Kingdom of Denmark, "Strategy for the Arctic 2011–2020," http://um.dk/en/~/media/UM/English-site/Documents/Politics-and-diplomacy/Arktis_Rapport_UK_210x270_Final_Web.ashx.

475 Ibid., 11.

potential friction points with each of these nations. The Danish strategy also mentions the disputed Hans Island, stressing the continued effort to arbitrate a peaceful outcome with Canada. As a testament to the Danish commitment towards Arctic cooperation, there is significant reference to the Ilulissat Declaration, the only nation to include this in its strategy. This is a landmark political declaration among the A5, stating that disputes will be handled responsibly and peacefully through negotiations.[476]

While the Danish strategy does mention Arctic sovereignty, it focuses on NATO and cooperation with Arctic partners. With respect to military capabilities, the strategy identifies the need for an Arctic risk analysis, an initiative that will help Denmark shape their armed forces for Northern operations.[477] The current military role in the Danish North is one of surveillance and presence, a posture that resembles that of Canada and Norway. There is no mention of potential Arctic military conflict in the strategy.

Self-sustaining growth and development is the second theme in the Denmark Arctic Strategy. It stresses the necessity to fully realize the immense economic opportunities in the North, while ensuring the highest levels of accountability with respect to the environment and Northern communities. Furthermore, the Ilulissat Declaration pledges responsible cooperation and stewardship among the five littoral nations, ensuring that resource exploitation is conducted with high standards and sustainability. As part of the development initiative, the Danish strategy is the only one to discuss international trade and investment.[478] Denmark considers Greenland a key node between the EU and U.S. economies, stating their intent to invest in additional Arctic infrastructure to facilitate increased trade.

In summary, the Danish Arctic strategy is focused on a peaceful and secure North, self-sustainable development, and cooperation with Arctic partners. Potential friction points exist with Canada in terms of Hans Island. Further disputes are possible with Canada, Norway, and Russia, due to overlapping ECS claims. Finally, there is a potential

476 Kingdom of Denmark, "Strategy for the Arctic 2011–2020," 14.

477 Ibid., 20.

478 Ibid., 34.

territorial claim in the Norwegian Sea, referred to as the "Banana Hole," that may conflict with claims already submitted by Norway and possibly Iceland.[479] However, "Denmark and Iceland submitted official statements to the United Nations stating that they did not object to Norway's claim regarding the Banana Hole region. Unfortunately, the cooperative relations between these nations were not shared by Russia. In response to the Norwegian submission, Russia declared the region of the Barents Sea claimed by Norway, including the Loop Hole, to be a "maritime dispute pursuant to the Commission's Rules of Procedure."[480] What this declared Russian dispute might result in is yet uncertain. "It is uncertain whether the Commission's forthcoming decision [once Denmark and Iceland also files its claims] will bring finality to the disputed area between Norway and Russia [and maybe Denmark and Iceland] or if it will only add fuel to the fire."[481]

C. NORWAY

The Norwegian Government's "High North Strategy" was founded in the white paper *Opportunities and Challenges in the North* (Report No. 30 to the sorting (2004–2005)).[482] The strategic importance placed on the Arctic is evident in the extremely detailed Norwegian High North Strategy. The Norwegian government openly considers the "High North to be Norway's most important strategic priority area in the years ahead."[483] There are seven key objectives identified by Norway:

1. Exercise authority in the North in a credible, consistent, and predictable way.

2. Be at the forefront of international efforts to develop knowledge in and about the High North.

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479 Isted, *Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations*, 362.

480 Isted, *Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations*, 361.

481 Ibid.

482 Norway Ministry of Foreign Affairs, "Strategy for the High North," December 1, 2006, http://www.regjeringen.no/en/dep/ud/Documents/Reports-programmes-of-action-and-plans/Action-plans-and-programmes/2006/strategy-for-the-high-north.html?id=448697.

483 Norway Ministry of Foreign Affairs, "Strategy for the High North," 7.

3. Be the best steward of the environment and natural resources in the High North.

4. Provide a suitable framework for further development of petroleum activities in the Barents Sea.

5. Ensure High North Policy to play a role in safeguarding the livelihoods, traditions, and cultures of indigenous peoples in the High North.

6. Continue to develop people-to-people cooperation in the High North.

7. Strengthen cooperation with Russia.

Of note, the document recognizes Norway's relationship with Russia as strategic for success in Arctic issues. The document details consideration for an "economic and industrial cooperation zone" shared with Russia as a "laboratory for practical Norwegian-Russian business cooperation in the north."[484]

The core tenet of the Norwegian strategy is to maintain an Arctic presence by exercising its sovereignty and authority in the High North.[485] A whole-of-government approach is directed in the strategy, synchronizing efforts of the armed forces, police, the prosecuting authority, and the Coast Guard. Furthermore, Norway has already shifted a majority of its Army activities to the North, taking a leading role in Northern military operations and serving as a training area for allied forces.[486] Not only is the overall strategic messaging of the strategy ambitious, Norway has quickly put their words into actions with a significant Northern presence. When compared to the rest of the A5, Norway has developed and implemented their High North strategy to the greatest degree. Norway further affirmed its sovereignty aspirations through a 250,000 square kilometer ECS claim under the authority of the UNCLOS, an action that is expected to overlap with claims from Denmark, Russia, and Iceland.[487]

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484 Norway Ministry of Foreign Affairs, "Strategy for the High North," 6.

485 Ibid., 7.

486 Ibid., 20.

487 Isted, *Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations*, 362.

The Norwegian Strategy speaks to cooperation; however, within its core objectives there is only mention of Russia. The strategy states that, "it is vital to maintain close bilateral relations with Russia, which is both a neighbor and the country with which we share the Barents Sea."[488] Norway is understandably taking a pragmatic view toward Russia, and recognizes that a number of its Norwegian challenges can only be rectified with strong cooperation. Surprisingly, there is little mention of the Arctic Council or other members of the A5.

A testament to their High North leadership role, Norway's strategy has a significant focus on knowledge generation and competence building. As a world leader in Polar research, Norway is actively pursuing to remain at the forefront of international efforts in Arctic research and development.[489] This aspiration carries directly over to their motivation regarding natural resources and environmental stewardship. Norway is eager to open the potential of the High North and has a clear vision to ensure the prosperity of the population and protection of the environment in the process.

In summary, Norway's Arctic strategy is extensive, well defined, and aggressive. Norway has already extended a significant whole of government presence in the High North and is eagerly striving to be the leading nation in the Arctic. The Norwegians are actively protecting their sovereignty and will continue to cooperate—primarily with Russia—to solve remaining disputes.

D. RUSSIA

The Russian Federation has extensive interest in the Arctic and continues to aggressively posture itself for an increased presence. The following six objectives represent Russia's key strategic priorities in the High North:

1. Expansion of the resource base of the Arctic zone.

2. Protection of the state border, and maintenance of a favorable operative regime, including the necessary fighting potential of the armed forces.

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[488] Norway Ministry of Foreign Affairs, "Strategy for the High North," 9.

[489] Norway Ministry of Foreign Affairs, "Strategy for the High North," 9, 24.

3. Preservation and maintenance of environmental protection of the Arctic.

4. Formation of a uniform information area in the Arctic zone.

5. Maintenance of fundamental and applied scientific research and accumulation of knowledge.

6. Maintenance of mutually advantageous bilateral and multilateral cooperation.[490]

The Russian strategy is aggressive in terms of sovereignty, stating an "expansion" of its resource base as a key tenet. Russia was actually the first nation to submit an ECS claim through the UNCLOS, boldly claiming half the Arctic Ocean; roughly 1.2 million square kilometers, which is about the size of Texas California and Indiana combined.[491] While the remaining A5 members contested the claim—which is with the UN for review—this intrepid move sent a clear strategic message to the International community. First, Russia is serious about its Arctic sovereignty. Second, Russia is displaying a willingness to cooperate under the rule of international law, a testament to their pledge to the Ilulissat Declaration.

Russia's strategy is also focused on military capability and homeland security. It stresses combating terrorism, suppressing illicit activity, preventing illegal migration, and protecting the state borders.[492] Russia already has a fleet of 18 Arctic capable icebreakers, and is actively pursuing means to further increase its stake in the High North.[493]

Finally, similar to the other four littoral nations, Russia is striving to exploit the potential of Arctic resources, while strengthening its position as a leader in all forms of

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490 Rossiyskaya Gazeta, *Basics of the State Policy of the Russian Federation in the Arctic for the Period Till 2020 and for a further Perspective*, 2009, http://www.arctic-lio.com/docs/nsr/legislation/Policy_of_the_RF_in_the_Arctic.pdf.

491 Isted, *Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations*, 359.

492 Rossiyskaya Gazeta, *Basics of the State Policy of the Russian Federation in the Arctic for the Period Till 2020 and for a Further Perspective*.

493 Isted, *Sovereignty in the Arctic: An Analysis of Territorial Disputes and Environmental Policy Considerations*, 360.

Polar research. The Russians are seeking a reliable High North means of communication, and are setting the conditions for effective and safe navigation—both maritime and air.

In summary, Russia has a huge stake in the Arctic and is aggressively attempting to increase its sovereign rights. It has a broad Arctic strategy that includes homeland security, resources, environmental protection, research and development, and a strong Northern military presence as described in Chapter III. Main points of potential conflict will likely refer to their extensive ECS claims and race for Arctic resources.

E. THE UNITED STATES

Until the 2013 U.S. "National Strategy for the Arctic Region, the United States had not made a statement relevant to the speed of geophysical changes taking place in the Arctic.[494] However, all within one year, the United States produced a national strategy, a Department of Defense Strategy, as well as a U.S. Navy strategy, and a plan for implementation of each of the strategies. The U.S. national Arctic strategy is titled "National Strategy for the Arctic Region." The U.S. Arctic strategy simply identifies the following three lines of effort:

1. Advance United States' Security Interests.
2. Pursue Responsible Arctic Stewardship.
3. Strengthen International Cooperation.[495]

The strategy explains that the lines of effort will be approached by four guiding principles:

- Safeguard Peace and Stability.
- Make Decisions Using the Best Available Information.
- Pursue Innovative Arrangements.
- Consult and Coordinate with Alaska Natives.[496]

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494 The most official document for US involvement in the Arctic prior to the 2013 National Arctic Strategy was the Ilulissat Declaration, 2008.

495 The White House, United States National Strategy for the Arctic Region, May 2013, 2, http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf.

The strategy places emphasis on environmental preservation and protection of resources; however, U.S. security and interests are the overarching goals. Intentions for employment of vessels and aircraft are expressed, with strong adherence to the UNCLOS and universally recognized laws of the seas. The strategy calls for the continued cooperation with international partnerships for enhanced security, which distributes responsibility across the members of the region. The newly accessible areas of the Arctic are recognized as an opportunity to chart areas previously inaccessible to science. The strategy articulates that such opportunities require consultation with local and indigenous organizations in the interest of proper stewardship. For a strategy pertaining to such a demanding environment as the Arctic, little reference is made to the U.S. materiel requirements for accomplishing its goals. However, the subsequent DOD, and Navy plan for implementation go into further detail on materiel necessary for accomplishing their goals, which are nested with the national strategy.

The U.S. DOD published its strategy for the Arctic, nested with the National Strategy for the Arctic Region. This is noteworthy as it is the first time that the DOD has published a strategy for the High North. The Arctic strategy lists four elements through which the DOD "will help the United States achieve its objectives as outlined in the *National Strategy for the Arctic Region …*"[497]

1. U.S. Interests in the Arctic.
2. Department of Defense Supporting Objectives.
    - Ensure security, support safety, promote defense cooperation.
    - Prepare for a wide range of challenges and contingencies.
3. Strategic Approach.
4. Challenges and Risks to the Strategic Approach.[498]

The means and ways described in the strategy imply that the role of security and defense forces is to collaborate for the protection of the ecosystem and reasonable

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[496] Ibid., 2–3.

[497] U.S. Department of Defense, "Arctic Strategy," 14.

[498] Ibid.

strategic objectives of interested countries. The exercise of sovereignty and security of borders in the interest of resource refinement summarizes the tone of the DOD strategy. While remaining somewhat general, this strategy implies that under the urgency impressed upon Arctic states by newly accessible resources, the potential for conflict exists. However, the goal of the Department of Defense is to maintain the cooperation of the states involved and avoid militarization of the Arctic.[499] The strategic approach mentioned is the combination of joint exercises to improve capability, as well as exercising sovereignty and protecting the freedom of the seas. International exercises, such as The NATO Exercise Cold Response in Norway, and Canada's Operation Nanook, are international venues through which partnerships in security and defense are improved. Challenges and risks to the strategic approach include premature defense spending on material to negotiate the changing environment. As stated specifically, in the document, fiscal constraints do not allow room for unnecessary spending when capabilities can be borrowed from international partners. The possibility of unintentionally isolating allies through unilateral pursuit of capability is potential risk highlighted in the strategic approach. As a result, increased cooperation by way of sharing capabilities in order to maintain security in the Arctic is the aim of the U.S. DOD Arctic strategy.

As the Department of Defense's primary maritime component, the U.S. Navy has also published an Arctic strategy.[500] Titled "U.S. Navy Arctic Roadmap, 2013–2014," the document is more specific in nature, describing the guidelines that the Navy must abide in the DOD and national strategies, then its own specific goals with time frames for each. The time frames are given as near-term (present to 2020), mid-term (2020–2030), and far-term (beyond 2030). Within each of the timeframes, navigability of the Arctic Ocean is the defining factor for the Navy's required level of response.[501] Additionally, this is the first official document that gives the strong economic incentives from

499 Ibid., 1.

500 United States Department of the Navy. *U.S. Navy Arctic Roadmap, 2013-2014.* U.S. Navy, Task Force Climate Change, February 2014. http://greenfleet.dodlive.mil/files/2014/02/USN-Arctic-Roadmap-2014.pdf

501 Ibid., 12.

resources as a reason for defense and security involvement, not for the protection of resources, but for the reinforcement of laws on traffic and commerce in the region.[502] The Navy's strategic objectives for the Arctic Region are listed as:

1. Ensure the United States Arctic sovereignty and provide homeland defense.
2. Provide ready naval forces to respond to crisis and contingencies.
3. Preserve freedom of the seas.
4. Promote partnerships within the [U.S.] Government and with international allies.

The Navy Arctic Roadmap emphasizes the requirement for strong cooperative partnerships with interagency and international Arctic Region stakeholders.[503] By 2030 the Navy will be able to respond to "contingencies and emergencies" affecting national security.[504] The Navy strategy explains that an increased reliability on U.S. Coast Guard, interagency, and international partners is essential for the continued levels of peace that currently characterize the Arctic. This reliability on other organizations is likely to compensate for the shortage of ice-capable vessels in the Navy's inventory, as outlined in previous assessments.[505] Overall, the Navy conveys a tone of capability that is correlated with the need for response. Currently, the need for response seems low; therefore, a combined effort shared with international partners is sufficient for security of U.S. interests in the Arctic.

The most recent document created by the United States is the "Implementation Plan for The National Strategy for the Arctic Region" (2014). The plan does not include drastically different objectives from the national strategy, as much as it embodies its namesake: a plan by which the United States can achieve its goals for the Arctic. This is a

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[502] Ibid., 13.

[503] Ibid., 19.

[504] Ibid., 18.

[505] Theme of the primary findings states that the U.S. Navy is characterized by an inability to operate in the austere Arctic environment, source: "Fleet Arctic Operations Game Report," U.S. Naval War College, 5, https://www.usnwc.edu/getattachment/Research---Gaming/War-Gaming/Documents/Publications/Game-Reports/FAOG-Game-Report-Final.pdf.

very specific document that identifies objectives, steps to take in order to reach those objectives, timelines for completion, and metrics by which to measure progress with the lead Agency for each objective.[506] Just as the other strategic documents do, the plan follows the national strategy's three lines of effort:

1. Advance U.S. Security Interests.
2. Pursue Responsible Arctic Region Stewardship.
3. Strengthen International Cooperation.[507]

The plan begins with the steps for advancing U.S. security interests, focusing on maritime, aviation, and communication. The underlying reason for the advancement of these fields is the increased activity anticipated in response to increased resource availability.[508] Interestingly, several of the agencies placed in the lead for these objectives are not traditionally associated with the defense and security industry. For example, the U.S. Department of Transportation is the lead agency charged with sustaining aviation requirements for the Arctic, with the DOD in support. This is interesting because the Department of Transportation is not usually associated with a capability to develop infrastructure in extreme environments, nor has it been known to undertake such an ambitious project. Several Agencies are named with responsibilities in the implementation plan, including the Department of State, DOD, Department of Transportation, and Department of Homeland Security, among others.[509] This document illustrates the interagency approach that the United States is taking to accomplish its goals among multiple agencies for the Arctic.

The geographic relationship between the United States and Canada is significant when it comes to challenges in the Arctic. Alaska is the only landmass of the United States that exists within the Arctic Circle, and is separated from the United States by

506 United States, "Implementation Plan for The National Strategy for the Arctic Region," http://www.whitehouse.gov/sites/default/files/docs/implementation_plan_for_the_national_strategy_for_the_arctic_region_-_fi....pdf.

507 Ibid., 1.

508 Ibid., 5

509 Ibid.

Canada. Canada is situated between the Arctic, Alaska, and the lower 48 U.S. states. As such, the United States shares interests and responsibilities with Canada for security and stewardship of the High North. However, the virtue of proximity to the Arctic Circle places a strategic importance on the U.S.-Canadian relationship to work together in the interest of defense and security of North America.[510]

In summary, the United States has compiled a comprehensive list of strategic documents regarding U.S. interests and security concerns in the Arctic, each with detailed language and considerations for the region. However, the inclusion of USSOF and planning considerations for the employment of USSOF in the Arctic are not mentioned. This is likely an effort to avoid the stigma that comes with USSOF affiliation and politically sensitive regions. Additionally, for classification and security reasons, USSOCOM does not publish the operational strategies of its force. As a leading unit for national security and defense operations, it is assumed that the USSOCOM strategies are succinctly nested within the U.S. National and Department of Defense Arctic strategies, and most likely coincides with the U.S. Navy Strategy in the Arctic.

[510] Donna Miles, "U.S., Canada Expand Arctic Cooperation, Military Training," American Forces Press Services, http://www.defense.gov/news/newsarticle.aspx?id=118768.

APPENDIX C. USE OF GAME THEORY ON THREE CURRENT ARCTIC CONFLICTS

Although the likelihood of armed conflict in the Arctic is considered very low, there are numerous unsettled issues such as unresolved boundary disputes and lingering sovereignty questions regarding key Arctic waterways. The most prominent conflicts in this perspective are: (1) Canada versus the United States with respect to the NWP and Beaufort Sea boundary; (2) Canada versus Denmark reference the ownership of Hans Island; (3) Denmark, Norway, and Iceland over a territorial claim in the Norwegian Sea; and (4) Russia and the other Arctic littoral states concerning their overlapping ECS claims.

B. THE CONFLICTS

This study applies game theory to ongoing disputes in the Arctic in order to gain insight into the conflicts and predict future likely outcomes. Several disputes in the Arctic seem interesting from a game theory perspective. First by examining the overlapping ECS claims between Russia, Denmark, and Canada, a game between Russia and NATO emerges. The second possible game analyzes Canada versus the United States, where the classification of the NWP is under dispute. The third and final game presents an analysis of Hans Island, which is claimed by both Canada and Denmark.

In order to limit the extent of this study, only the complete study of the Russia-NATO game is included. For the other games only a background description, a description of the game, and the conclusion are provided in order to show the premises and relevance of the game. The structure of the full analysis is as follows: each analysis begins with a brief background, explaining the strategic security environment and the core assumptions used in the game. Next, the game is presented using ordinal rankings, with four possible outcomes and explanations of what these outcomes mean to each player. The strategic moves available to each player are then discussed, outlining the difference in the game with and without communications. Interval scaling will then be applied to gain insight into the values of the different outcomes, and the strategic position

for each player. The final step involves determining the Nash fair point, which is then used to explain the real-world possibilities that are concluded from the game. The aim is to offer a quantitative analysis that can be used to assess the three aforementioned disputes, providing a perspective that contributes to a comprehensive multi-disciplinary approach.

C. GAME 1: RUSSIA/NATO

Another ongoing Arctic dispute is the claim of the Lomonosov Ridge. This underwater ridge of continental crust in the Arctic Ocean spans 1800 km from the New Siberian Islands, over the central part of the Arctic Ocean, to Ellesmere Island of the Canadian Arctic Archipelago. The geological structure of the ridge attracted international attention due to a December 20, 2001, official submission by the Russian Federation to the UNCLCS, in accordance with the UNCLOS. The document proposed establishing new outer limits for the Russian continental shelf, beyond the previous 200-mile EEZ, but within the Russian Arctic sector. The territory claimed by Russia in the submission is a large portion of the Arctic, extending all the way to the North Pole. The Russians contend that both the underwater Lomonosov Ridge and the Mendeleev Ridge are extensions of the Eurasian continent. In 2002, the UN Commission neither rejected nor accepted the Russian proposal, recommending additional research. There is much at stake, as the Russian Ministry of Natural Resources has stated that the Russian region of the Arctic contains approximately 80 billion tons of hydrocarbons. If the Lomonosov Ridge claim is successful, the Russian share will increase by at least 10 billion tons.

Both Denmark and Canada are claimants of these same ridges. Danish scientists hope to prove that the ridge is an extension of Greenland, and Canada asserts that the ridge is an extension of its continental shelf. If the UN is unable to solve this claim through UNCLOS, with Denmark and Canada both part of NATO, this could potentially end up in a conflict between Russia and NATO.

1. The Game

The setup of this game starts with the identification of the two parties involved. For this conflict there is Russia as the column player and NATO as the row player

(Figure 26). As four out of the five Arctic council members are also members of NATO, potential armed conflicts will likely involve the alliance, with Russia as a possible aggressor. Conflict in this game is defined as, 'the willingness to use military force versus the preference for other options to solve the conflict.'

	Russia		
NATO		Military option **C**	Other option **D**
	Military option **A**	(A,C)	(A,D)
	Other option **B**	(B,C)	(B,D)

Figure 26. NATO versus Russia.

There are four possible results:

AC – NATO and Russia are both willing to fight over this issue.

AD – NATO is willing to fight over this issue and Russia is not.

BC – NATO is not willing to fight over this issue; however, Russia is.

BD – Neither NATO nor Russia is willing to fight over this issue, and they both look for a diplomatic solution.

In order to understand this 'game' between Russia and NATO, and to be able to utilize this for further strategic analysis, a rank order with a 1–4 scale is created (Table7). The different descriptions of best, next best, least best, and worst options, are based on five core assumptions: (1) both NATO and Russia are rational players; (2) both players try to maximize their outcomes; (3) Russia prefers to use military force rather than solving through other means; (4) Russia values its reputation as most important and is willing to fight over it; and (5) this is a partial conflict game. Table 7 outlines the four options available to each player.

Table 7. Options for NATO and Russia ranked from best to worst (4 to 1).

	NATO options	Russia options
4- Best option	NATO is willing to fight over this conflict and Russia is not.	Russia is prepared to fight over this conflict, and NATO, for various reasons, is not. This would be the ultimate victory for Russia.
3– Next Best option	NATO is not willing to fight over this conflict and neither is Russia. A diplomatic solution will be sought.	Russia is not prepared to fight over this conflict, and neither is NATO. A diplomatic solution will be sought.
2– Least Best option	NATO is not prepared to fight over this conflict and will push for a diplomatic solution. However, Russia is prepared to fight.	Russia is prepared to fight over this conflict and so is NATO. Costly in terms of resources but no loss of face.
1– Worst option	NATO is willing to fight over this conflict and so is Russia.	Russia is not prepared to fight over this conflict; however, NATO is. This will result in loss of face for the Russians.

What automatically follows from this ranking, and made visible in Figure 27, is the Nash equilibrium. This is the position from where both players cannot unilaterally improve.[511] In this game, (2,4) is the Nash equilibrium, which is an interesting observation. Figure 27 also shows that Russia has a dominant strategy, and NATO does not. An analysis of the strategic moves available to each player is required to determine if a mutually preferred outcome is possible.

511 Avinash K. Dixit, *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life* (New York: W.W. Norton & Company, 1993), 74.

	Russia		
NATO		Military option C	Other option D
	Military option A	(1,2)	(4,1)
	Other option B	(2, 4)	(3,3)

Figure 27. NATO versus Russia.

2. Strategic Moves

By doing a strategic moves analysis, one can determine if either player can change the outcome by either communicating, issuing a threat, and or a promise. The analysis will be conducted from both NATO and Russia's perspective (Figure 27).

From NATO perspective:

NATO moves first:

- If NATO does A, then Russia does C, which results in outcome AC with value (1,2).
- If NATO does B, then Russia does C, which results in outcome BC with value (2,4).

Regardless of what NATO does when moving first, Russia will maximize its outcome and prefers the military option. Therefore, NATO does not want to move first without issuing a threat and or promise.

Force Russia moves first:

- If Russia does C, then NATO does B, which results in outcome CB with value (2,4).
- If Russia does D, then NATO does A, which results in outcome AD with value (4,1).

If Russia moves first, it prefers option C. This is also Russia's dominant strategy.

NATO issues a threat to Russia:

NATO wants Russia to choose option D and therefore has to make a threat on C.

- Threat: If Russia does C, NATO does A, resulting in AC with value (1,2).
- Normally: If Russia does C, NATO does B, resulting in BC with value (2,4). The value of AC is worse for both players, so this is a credible threat and will eliminate option BC. However, this threat does not work by itself.

NATO issues a promise to Russia:

- Promise: If Russia does D, NATO does B, resulting in value (3,3).
- Normally: If Russia does D, NATO does A, resulting in value (4,1).

This is a promise, as it harms NATO and benefits Russia. This will eliminate option AD.

It is not insightful to go through the strategic moves from Russia's perspective, as we know Russia has a dominant strategy, and a first move to choose this strategy.

In summary, Russia has a first move advantage and a dominant strategy for option C, solving the conflict using military means. In order to force another solution, NATO has to issue a threat on C, in combination with a promise on D. This will result in the preferred outcome BD.

3. Interval Scaling

An interval scaling allows one to reflect the weighted preference of options available to both NATO and Russia. Table 8 gives NATO's options ranked and weighted.

Table 8. Options available to NATO with assigned cardinal utilities.

	NATO's options
10- Best	The best outcome for NATO would be that Russia is unable and/or unwilling to fight over this dispute, and that NATO is. This will solve this dispute in favor of NATO and strengthen the alliance.
9 – Next Best	The next best outcome is that there will be a diplomatic solution for the current dispute. It is likely that a diplomatic solution will eventually weaken the initial Russian claim, as the combined NATO countries have more influence than Russia does.
3– Least Best	The least desirable outcome for NATO is that it is unwilling to fight over this dispute and Russia is. Although some damage control needs to be done in order to save NATO's reputation, the risks for the alliance to fight over this dispute with Russia are bigger than not to do so.
1 – Worst	The worst outcome is that Russia is willing to fight over this dispute and that NATO has committed itself to do so as well. Because of the nature of this dispute, it will prove extremely difficult to persuade the alliance to fight against Russia over this. This could severely weaken the reputation of the alliance, and worst case, end it.

Table 9. Options available to Russia with assigned cardinal utilities.

	Russia's options
10- Best	The very best outcome for Russia would be that NATO is not willing to fight over this dispute and is under the assumption that Russia will. Russia will stick to their territorial claim and will get their best outcome. This will also give a boost to Russia's reputation.
7 – Next Best	The next best outcome is that there will be a diplomatic solution for the current dispute. However, chances are that this diplomatic solution will be a compromise of the initial Russian claim. This could mean that Russia has to give in on its original claim and this will make Russia look weak.
6– Least Best	The least best outcome is that both Russia and NATO are willing to fight over this dispute. Russia's reputation will remain strong in the short term, however, conflict is costly and unfavorable for a struggling economy. Furthermore, it is highly unlikely that Russia will win this conflict, possibly resulting in a long-term loss of reputation.
1 – Worst	The worst outcome is that Russia is unable and unwilling to fight over this dispute, and NATO is. The dispute is settled in favor of NATO, territory and future revenue is lost and so is Russia's reputation.

	Russia		
		Military conflict **C**	No conflict **D**
NATO	Military conflict **A**	(1,6)	(10,1)
	No conflict **B**	(3,10)	(9,7)

Figure 28. NATO versus Russia.

The utility scale offers better insight into the perceived values of both players. For example, Russia's worst outcome is far worse than its least best outcome, and NATO's best and second best outcomes are really close together, compared to its least desirable and worst outcomes. The Nash Equilibrium has a value of (3,10), while preferred BD outcome has a value of (9,7).

In Figure 29, the Pareto-optimal solutions are found on the green line BC-AD. The outcome BD, with value (9,7), is on this line. Determining the Nash fair point will facilitate an analysis of the (9,7) outcome, since a mixed a mixed strategy solution is unrealistic in this scenario. In order to find the Nash fair point of this game, it is first necessary to decide on a status quo point. This can be the security level for both players, with value (3,6), or the optimum threat position, with value (1,6). The latter will be used, since it is highly likely for NATO to threaten military force (AC). As shown in Figure 28, with (1,6) as a status quo point, the Nash fair point is (6, 8.5). What this fair point provides is a means for analyzing the (9,7) preferred outcome. In this case, NATO is receiving a premium of 3 points (9-6), while Russia is suffering a loss of 1.5 points (7-8.5). This indicates that the (9,7) outcome is more advantageous to NATO than it is to Russia.

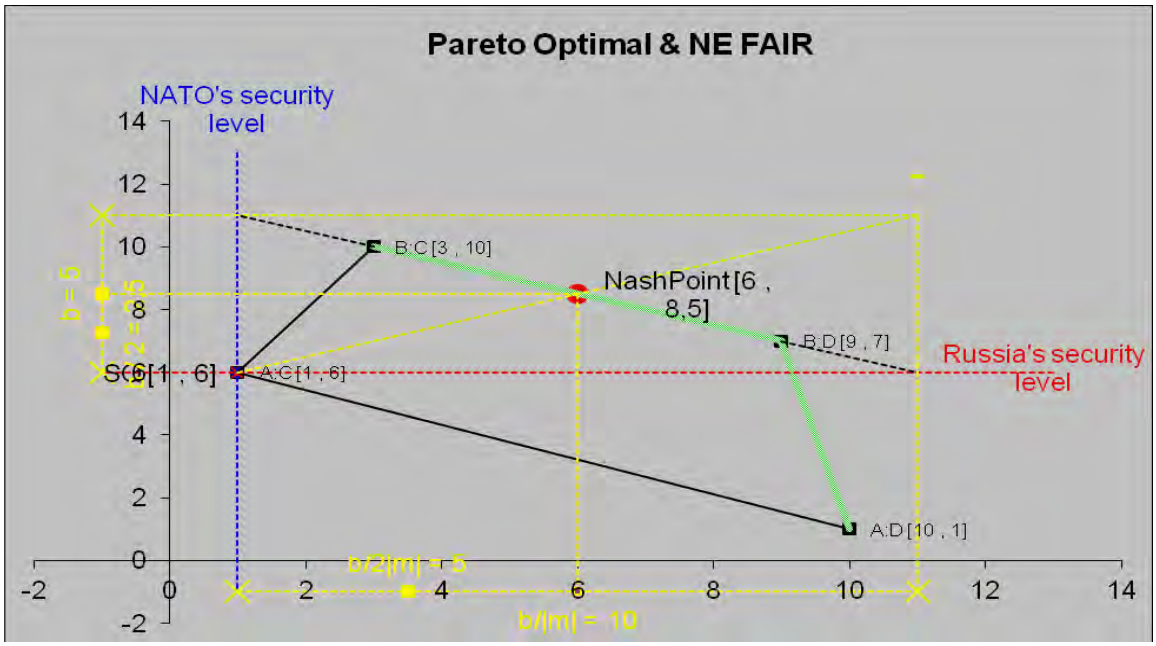

Figure 29. Pareto optimal and Nash fair point.

4. Conclusion

The game between Russia and NATO is interesting and could become a realistic Arctic scenario in the near future. Although the chance of conventional military conflict between Russia and NATO in the Arctic is small, it cannot be ruled out. There are two core assumptions that have a decisive impact on how this game develops. First and foremost is the assumption that Russia prefers to solve this territorial claim through use of military force, or threatening to do so, rather than solving it through other means. This ties in to a second core assumption that reputation is of vital importance to Russia and that they are willing to fight over it. This leaves the Russians with a dominant strategy and a first-move advantage. All that NATO can and will do, as shown in the strategic move paragraph, is to make a credible threat in combination with a credible promise to get to a peaceful solution. The value of this outcome (9,7), however, is not entirely fair compared to the Nash fair point (6, 8.5), and clearly favors NATO. In this case, it will not change the game. The insight here is to know that the expected outcome of this game is most likely not perceived being fair by the Russians, and could mean that NATO has a worse bargaining position in other future conflicts with Russia.

D. GAME 2: CANADA/UNITED STATES

A second potential conflict in the Arctic involves Canada and the United States; specifically, what is the classification of the NWP? With the melting of the polar ice and a forecasted increase in all arctic maritime travel, the NWP will prove to be a lucrative shipping lane in the very near future. Canada currently maintains the position that the NWP is within domestic internal waters, and as such, dictates that international traffic registers all voyages with the Canadian Coast Guard. The United States on the other hand, argues that the NWP is an international strait, which therefore allows unlimited travel for all vessels who wish to pass.

Both nations have significant self-interest objectives with respect to their claim. The United States seeks to achieve freedom of movement, primarily as a means of maintaining state security from potential threats approaching through Arctic waters. Canada views access to the NWP as a vital aspect of national sovereignty. At the center of the dispute is the UNCLOS, of which Canada is a member and the United States is not. The Canadian Forces Arctic Strategy stresses compliance with international law, and seeks cooperation to rectify disputes that will only increase as the Arctic continues to open. The United States is adamant that the NWP should be classified as international waters. While a peaceful resolution is a virtual certainty, this ongoing dispute deserves further analysis through game theory.

1. The Game

The setup of this game starts with the identification of the two parties involved. For this conflict it will be Canada and the United States, as already discussed. Canada will be portrayed as the row player, while the United States will be the column player. It is important to note that a final decision for designation of the NWP will be through the UNCLOS under the basis of international law. Furthermore, such a decision is likely many years from fruition. In the meantime, Canada has two rather obvious options; maintain a claim over the NWP or withdraw the claim altogether. While the options for the Unites States are not quite as simple, they are narrowed in scope to the following: continue to pursue the NWP as an international straight, or simply pursue a bilateral

agreement with Canada that allows freedom of navigation for homeland security purposes.

There are some key assumptions when analyzing this game between Canada and the United States. For the sake of this game, it will be assumed that the United States will not tolerate any outcome that prevents it from accessing the NWP for matters of homeland security. Being the sole global hegemon, this is both a valid and realistic assumption. Despite its military might, the United States does wish to enable maritime navigation in the NWP in accordance with international law. Therefore, it is assumed that the United States will not simply ignore this issue and sail in NWP waters without Canadian consent (under the status quo conditions). It will also be assumed that the United States will obey the UNCLOS, despite the fact that it has yet to ratify the convention. Finally, any bilateral agreement would allow the United States freedom of Arctic maritime navigation only for the purposes of homeland security. It would exclude navigation for the purposes of trade, tourism, or any other economic stimuli. While Canada and the United States have a history of "agree to disagree" over the NWP, the melting of the polar ice has the potential to strain an otherwise strong diplomatic relationship. The following game (Figure 30) presents the options available to each country.

	United States		
Canada		Pursue Intl. Strait **C**	Pursue Bilateral Agreement **D**
	Maintain Claim **A**	(A,C)	(A,D)
	Withdraw Claim **B**	(B,C)	(B,D)

Figure 30. Canada versus the United States.

There are four possible results:

AC – Canada maintains its claim over the NWP and the United States continues to pursue classification of the passage as an international strait. This is the current diplomatic position for each country.

AD – Canada maintains its claim, and is willing to cooperate in finding a diplomatic solution. The United States agrees that the NWP is Canadian internal waters, but pursues a bilateral agreement that allows its use of the strait for homeland security interests.

BC – Canada withdraws its claim due to international pressure and the United States pursues the passage as an international strait.

BD – Canada withdraws its claim due to international pressure and the United States pursues a bilateral agreement.

2. Conclusion

The following courses of action (COA) present three different outcomes that could result from the NWP dispute between Canada and the United States. It is important to note that this quantitative analysis is just one approach for examining this dispute. The numbers from the game offer an interesting perspective to the options available to each country.

COA 1. In an effort to make up for the favorable Canadian outcome of (10,7), Canada concedes the border in the Beaufort Sea to the United States. This Arctic border dispute—the extended continental shelf dividing line between Alaska and the Yukon—is another issue between these two nations. While another game would need to be analyzed to identify the true value to each country, Canada could make a promise to the United States that the surplus utility from the NWP deal would be repaid.

COA 2. It is possible that the United States will not accept the (10,7) outcome, likely resulting in the AC (4,3) status quo. This would simply put off an inevitable resolution, potentially straining relations and incurring opportunity costs until a solution is found.

COA 3. Canada is able to claim the NWP before the United States ratifies the UNCLOS. This would be an ultimate first move for Canada, negating the need for a bilateral agreement. As it turns out, however, a bilateral security agreement in the Arctic, akin to NORAD, could prove extremely beneficial to Canada, making it a likely outcome regardless.

The polar ice is melting and the status quo "agree to disagree" will no longer be a sufficient national strategy for issues such as the NWP designation. Canada and the United States require an outcome that protects Canadian sovereignty, enables United States homeland security, and bolsters relations between these two Arctic neighbors. From this game theory analysis, it is recommended that Canada maintains a claim over the NWP and agrees to a bilateral security arrangement with the United States. Since this result would favor Canadian interests, future concession would be required when solving the dispute over the Beaufort Sea boundary.

E. GAME 3: CANADA/DENMARK

For more than 30 years, Canada and the Kingdom of Denmark have been negotiating the borders between Greenland and Canada. On November 28, 2012, the two parties finally signed an agreement on how to settle the borders. The agreement draws a 3000 km line from southern Greenland up through the Davis Strait, Baffin Bay, and the narrow Nares Strait, all the way up to the northern Arctic Ocean. However, the two nations do not agree on how to draw that line around the small landmass of Hans Island. Hans Island is a small, uninhabited barren knoll, measuring 1.3 km^2, located in the center of the Kennedy Channel in the Nares Strait. Nares Strait separates Ellesmere Island from northern Greenland, and connects Baffin Bay with the Lincoln Sea. There is no indication that the ongoing diplomatic sword strokes will subside, as both countries attempt to prove how the continental shelf is tied into their respective territories. Although politicians in both states are optimistic for a diplomatic solution, the dispute might well end up at the international court in The Hague.[512]

512 Ritzau, " Strid om Hans Oe kan ende ved Haag-domstol," [Dispute about Hans Island May End Up at the Haag Tribunal] *Boersen*, April 17, 2012, http://borsen.dk/nyheder/politik/artikel/1/230368/strid_om_hans_oe_kan_ende_ved_haag-domstol.html.

1. The Game

The two parties involved are Canada and Denmark, with Canada portrayed as the row player, and Denmark as the column player (Figure 31). It is important to note that a final decision on division of the territory will be under the basis of international law. Furthermore, this decision is likely years from fruition, with significant scientific research required to form the basis for a legal decision. In this game, Canada has two obvious options: maintain a claim over Hans Island or not. The options for Denmark are the same. The game itself is very simple; however, history shows that a solution is not.

There are some key assumptions for this game. From a homeland security perspective, control of the Arctic region is of greater importance to Canada than it is to Denmark. Access to this part of the coastline provides direct access to Canada, and the United States. For Denmark, this coastline only provides access to Greenland, which although vast, is still quite isolated and inaccessible. However, when looking at it from an economic angle, the resources are relatively significant from a Danish point of view. From a Canadian perspective the resource base is less significant, with one of the world's largest oil reserves within existing Canadian borders. This dispute is between two strong allies and has lasted for decades; hence, there is essentially no chance of it resulting in military conflict. However, given the rapid Arctic climate change, a resolution is required in the near future.

	Denmark		
Canada		Claim **C**	No Claim **D**
	Claim **A**	(A,C)	(A,D)
	No Claim **B**	(B,C)	(B,D)

Figure 31. Canada versus Denmark.

There are four possible outcomes:

AC – Both countries uphold their claim on Hans Island.

AD – Canada claims Hans Island. Denmark does not claim. Hans Island becomes Canadian.

BC – Denmark Claims Hans Island. Canada does not claim. Hans Island becomes Danish.

BD – Neither Canada nor Denmark claims Hans Island, and a negotiation ensues.

In order to analyze the game, an ordinal ranking of the options available to each country is required.

2. Conclusion

The dispute over Hans Island has lasted for more than three decades. There is no sign of Canada or Denmark yielding to the other party's claim. However, there is also no sign of this conflict turning into to a military crisis. In effect, history shows us that outcome AC, BC, or AD, will not happen. The only likely outcome is then found somewhere around BD, which represents a compromise. However, in its pure form, BD is not acceptable either. Nash arbitration shows what that compromise looks like from a mathematical perspective. However, in politics, subjective facts matter more than objective facts.[513] This means that the numbers do not necessarily translate directly into a division of the territory. What do the numbers show? When meeting at the negotiation table, Canada expects to get between 62.5 and 75 percent of the territorial value while Denmark expects to get between 25 and 37.5 percent. Because of the likely subjective perceptions of the two countries, it is not possible to predict a specific outcome from the negotiations. The important realization is how the individual rankings determine what the negotiation set and the Nash point is. With this in mind, the negotiators can meet with realistic expectations.

513 Professor Gordon H. McCormick, in discussion with the authors, Naval Postgraduate School, Monterey, June 22, 2013.

F. SUMMARY

This study applies game theory to three ongoing Arctic disputes, with a view to providing a quantitative analysis that can possibly predict likely outcomes and optimum courses of action. The first section presents an analysis of a Russia versus NATO scenario, regarding the Lomonosov Ridge. In this scenario, NATO is required to make a combination threat and promise to counter the aggressive Russian dominant strategy of using military force. While a peaceful negotiation is the likely outcome, Russia would perceive it as biased towards NATO, and would therefore likely expect some form of repayment in future negotiations.

The second game examines the designation of the NWP between Canada and the United States. Canada and the United States require an outcome that protects Canadian sovereignty and enables United States homeland security. The preferred outcome sees Canada maintaining a claim for the NWP, while the United States seeks to coordinate a bilateral security agreement. Since such a result would slightly favor Canada, it can be expected that the United States would be somehow repaid in future negotiations, such as dealing with the Beaufort Sea boundary.

The third and final game examines the Hans Island dispute between Canada and Denmark. In this game, a fair result would give Canada approximately 62.5 to 75 percent of the territorial value, while Denmark can expect between 25 and 37.5 percent. While a division of landmass in these proportions is unlikely, these number represent the relative value of the island that each nation should seek in a diplomatic solution.

In all three cases, game theory provides a very insightful view of the dispute. Game theory supports the previous statement from Kraska in Chapter IV by highlighting the importance of how the Arctic stakeholders choose to frame the situation will determine the possible outcomes. Game theory also shows within what framework the cooperative efforts must navigate in the evolving Arctic. Given the nature of the scenarios, mixed strategies are not realistic or feasible. Determining Nash fair points allows for an analysis of each likely outcome, drawing out strategic advantages and a level of fairness for each solution. As with all matters in international politics, this is but

one lens through which to view these disputes. Such results can be used when seeking diplomatic solutions, offering each country an approximation of what can be expected.

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APPENDIX D. DISCUSSION ON SOF DOCTRINE

In this thesis, Chapter II and Appendix A on Arctic weather provided an understanding of the meteorological conditions to be expected in the Arctic as the sea ice continues to melt. The vast distances and lack of infrastructure augment the effects of the adverse Arctic weather conditions as described previously, and may result in special requirements to conduct successful military operations in the Arctic. In combination with the politically sensitive environment described in Chapter III, this may preclude the use of conventional forces or set forth certain requirements for conducting missions in the Arctic. This appendix will provide pertinent preliminary conclusions rather than merely list the roles and mission of SOF. In other words, the following discusses special operations roles and mission in an Arctic context.

NATO Allied Joint Doctrine for Special Operations (AJP-3.5) describes special operations as "military activities conducted by specially designated, organized, trained, and equipped forces using operational tactics, and modes of operation not standard to conventional forces."[514] Furthermore, these operations can be conducted independently or in conjunction with operations of conventional forces, and may include combined and interagency operations, by, with, and through indigenous or surrogate forces.[515] Tucker and Lamb differentiate between SOF in a leading role, independent or with conventional forces in support, and a supporting effort.[516] They also argue that SOF missions can be divided in direct and indirect missions. Although a very limited description of SOF missions—in accordance with the U.S. DOD global campaign plan for the war on terror in accordance with JP 3–05[517]—this is useful as it underscores the diverse commando and warrior-diplomat skills that SOF must have in order to perform well in a highly political security environment. While SOF in the Arctic should not exclusively be viewed

514 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine for Special Operations (AJP 3.5)*, 1-1.

515 Ibid.

516 Tucker and Lamb, *United States Special Operation Forces*, 151.

517 U.S. Department of Defense, Joint Publication 3-05, Special Operations, II-9.

from a NATO perspective, AJP-3.5 lays the doctrinal foundation for NATO SOF. Considering that four out of the A5 countries are NATO members, and the fact that the United States is a major contributor to international security policy, NATO and U.S. doctrine seems like a relevant basis to describe the roles and missions for SOF. Because this is not merely an analysis of SOF, but rather an analysis on future roles and mission in the Arctic for SOF as a consequence of political ramifications—just as the geophysical study in Chapter II and Appendix A laid out what special conditions may impact how to operate in the Arctic—elements from NATO AJP-01(D), U.S. DOD JP-1, NATO AJP-3(B), and U.S. DOD JP 3–05 are included to highlight differences as well as similarities in alliance doctrine. This provides the necessary political-strategic foundation available to the alliance as well as doctrinal contrast, specifically indicating when SOF may be the preferred tool and equally important what conditions make conventional support essential for mission success. While NATO MC0437/2 "Special Operations Policy"[518] is of a later date than AJP 3.5, it is policy and not doctrine. Furthermore, all the relevant parts of this policy are captured in the analysis of NATO and U.S. doctrine. Hence, MC0437/2 is not included in this study. The included NATO and U.S. doctrine is complemented by academic writings by Tucker and Lamb,[519] and Robert Spulak.[520] The authors all provide pertinent insights into the application of SOF, effectively complementing the thoughts behind SOF doctrine while intelligently critiquing the application of SOF.

> NATO's essential and enduring purpose … is to safeguard the freedom and security of all its members. … Whilst it continues to provide stability throughout the Euro-Atlantic area … it is also evolving to meet new threats that include terrorism and the proliferation in weapons of mass destruction (WMD). [NATO] … serves as a forum for the considerations of matters affecting members' security.[521]

AJP-01(D) predicts that "competition for scarce resources and global demand for energy resources in particular will intensify."[522] This prediction seems credible in light of

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518 North Atlantic Treaty Organization [NATO], MC0432/2 (Final), April 21, 2011.

519 Tucker and Lamb, *United States Special Operation Forces*.

520 Spulak, *A Theory of Special Operations: The Origin, Qualities, and Use of SOF*, JSOU-R-07-7.

521 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine (AJP 01(D)),* 2-1.

522 Ibid., section 0212 c.

this study. This seems to be supported by U.S. DOD JP-01 stating: "To succeed we must refine and proportionally integrate the military with all the tools of American power and work with our partner nations to do the same."[523]

Before analyzing SOF-specific doctrine, a fundamental discussion on NATO doctrine seems relevant.

> Doctrine is defined as fundamental principles by which military forces guide their actions … it is authoritative, but requires judgment in application…. Factors which influence the development of doctrine [is the] response to changes in policy…. Ultimately, policy and doctrine should strive to be consistent and mutually supportive. … A common NATO doctrine is essential to enhance interoperability.[524]

This explanation is critical to recognize in the analysis of the evolving Arctic, the national policies, and the military (SOF) capabilities since doctrine and interoperability are integral elements of the NATO DOTMLPFI capability definition used later. U.S. DOD JP-01 supports this in the following manner, "The guidance in this publication is broad, authoritative, and serves as a foundation for the development of more specific joint guidance.… Interoperability and effective integration of service enhance joint operations to accomplish U.S. government objective(s)."[525] Finally, according to AJP-01 and JP-01, to be an effective instrument of Alliance strategy, the collective military instrument must be maintained and developed in a manner consistent with the demands that are likely to be placed upon it."[526] Furthermore, "[the joint publication is] … a bridge between policy and doctrine."[527] This element is vital to appreciate as it creates the basis for analyzing to what extent the hierarchy of (AJP and JP) doctrines actually bridge the gap between the scenario-based capability requirements and the doctrinal foundation.

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523 U.S. Department of Defense, *Joint Publication 1: Doctrine for the Armed Forces of the United States*, i.

524 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine (AJP 01(D)),* 1-1.

525 U.S. Department of Defense, *Joint Publication 1: Doctrine for the Armed Forces of the United States*, ii.

526 North Atlantic Treaty Organization [NATO], *Allied Joint Doctrine (AJP 01(D)),* 1-3, 1-4.

527 U.S. Department of Defense, *Joint Publication 1: Doctrine for the Armed Forces of the United States*, I-1.

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